

MACWORLD

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The Macintosh® Magazine

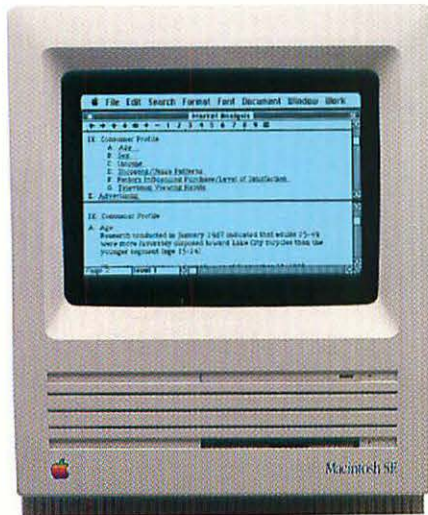
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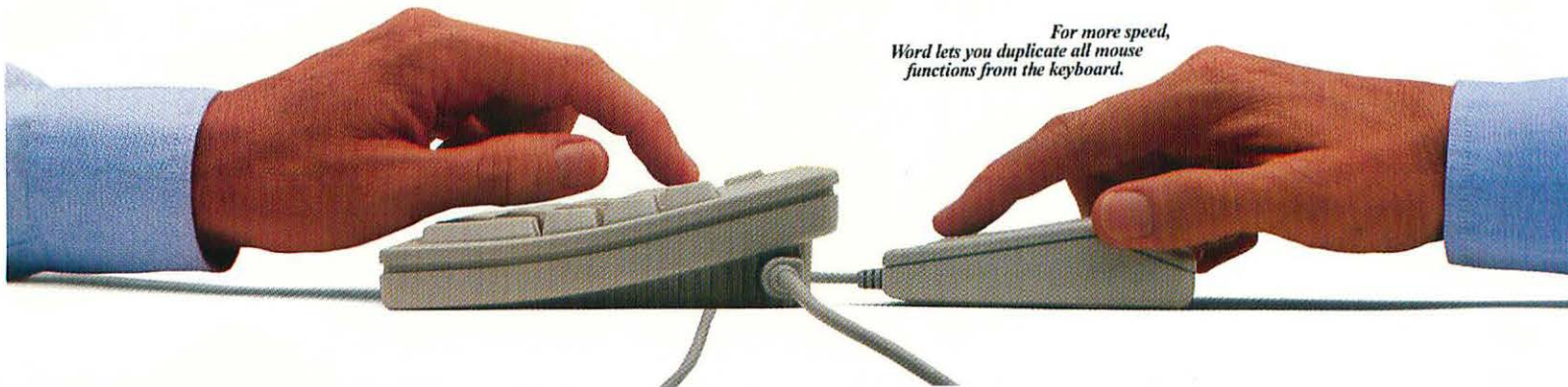
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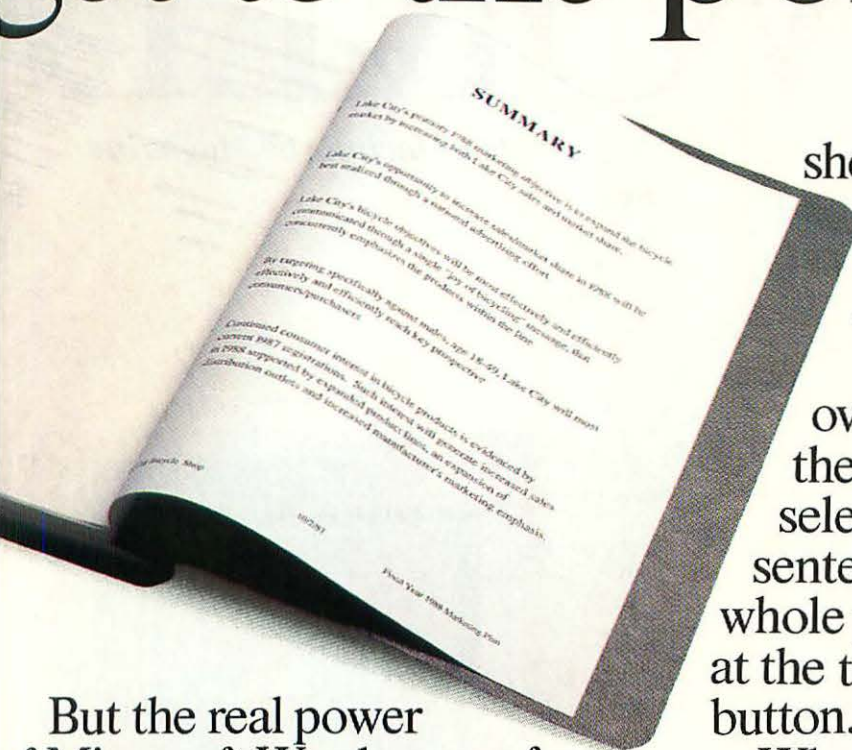
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get to the point.



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Advanced features, like command and accelerator keys, that

highest concentration of owners in a single age group with 12.7 percent. The combined age group of 25-34 accounted for the greatest concentration of total bicycle sales with 55.4 percent.

Relative to population in each age group, sales indicate that there is above average interest in bicycle products in the 15-44 age categories. Sales are relatively lower, at 27.6 percent, for the younger segment (age 15-24); this is significant given the fact that the population in this segment is almost half that of the 25-49 segment.

The discrepancy between the information from Lake City's warranty registrations and the current research finds may be due to the following:

showed that the 25-34 age group had the highest concentration of owners in the age group going with 12.7 percent. The combined age group of 25-34 accounted for the greatest concentration of total bicycle sales with 55.4 percent.

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The discrepancy between the information from Lake City's warranty registrations and the current research finds may be due to the following:

- Lake City's warranty registrations may not reflect actual sales figures regarding new purchases.
- The warranty registrations may be for bicycles purchased at the retail level.
- The warranty registrations may be for bicycles purchased at the retail level.

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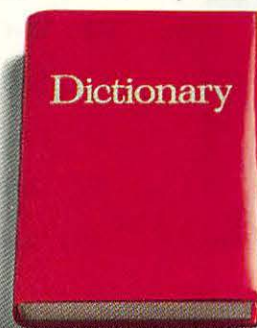
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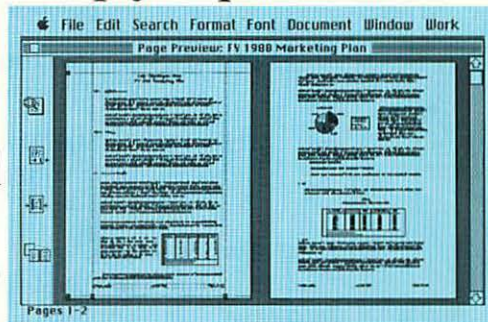
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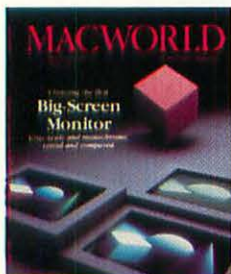
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May 1988

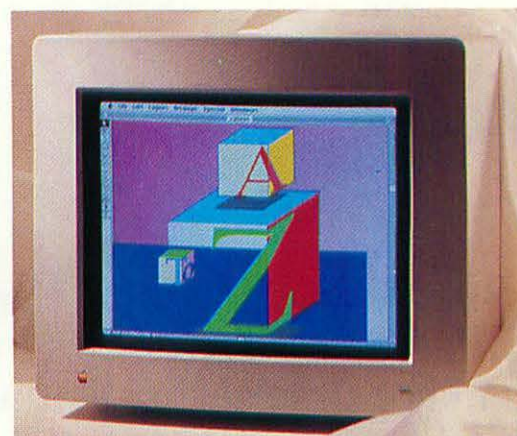
The Macintosh® Magazine

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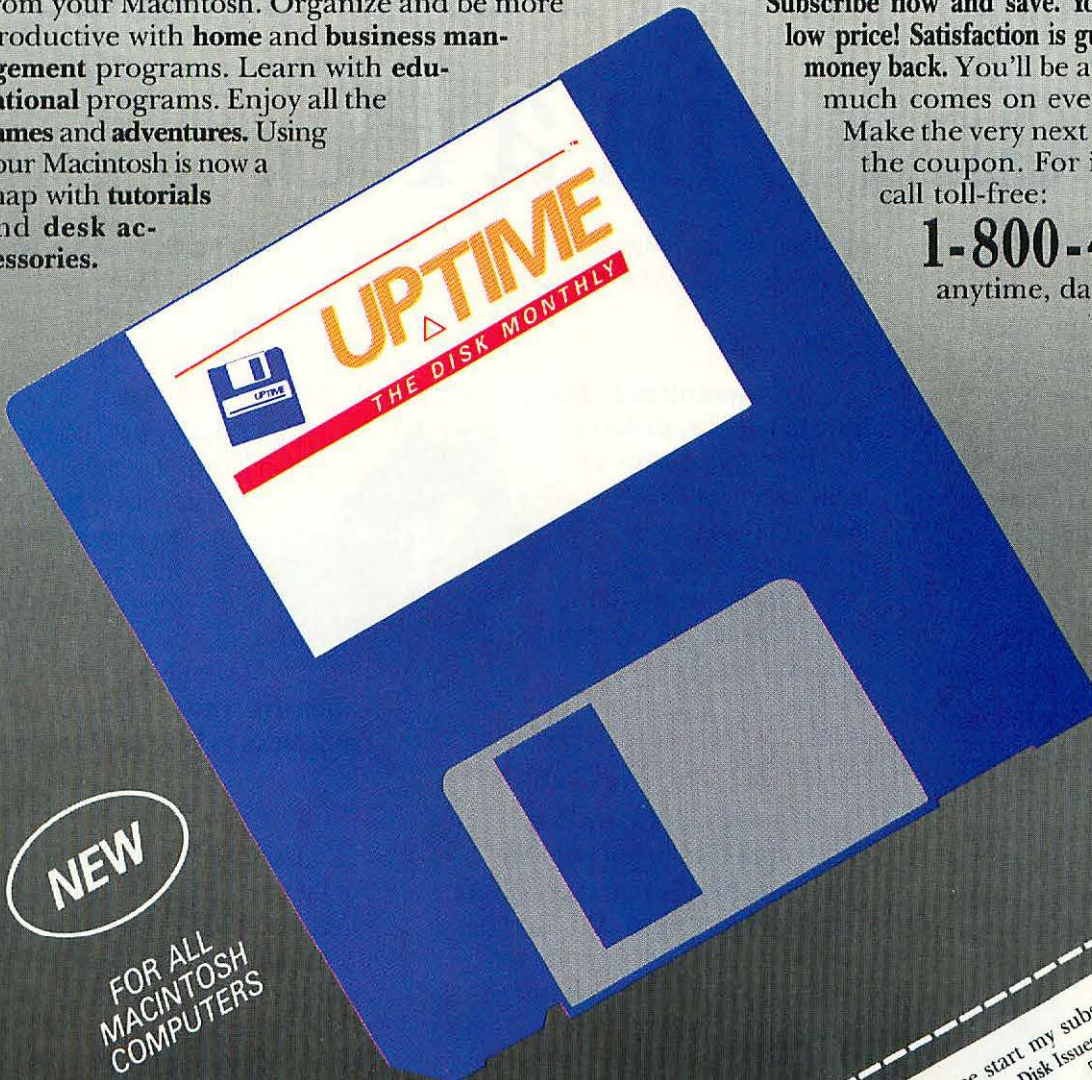
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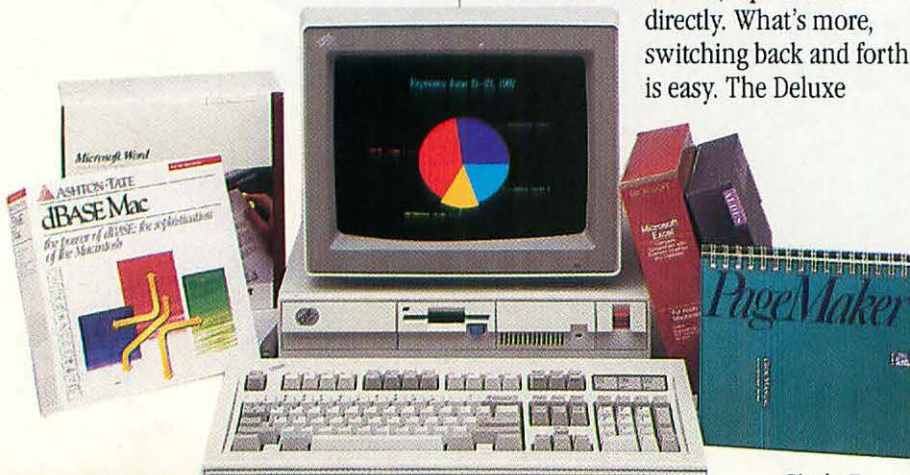
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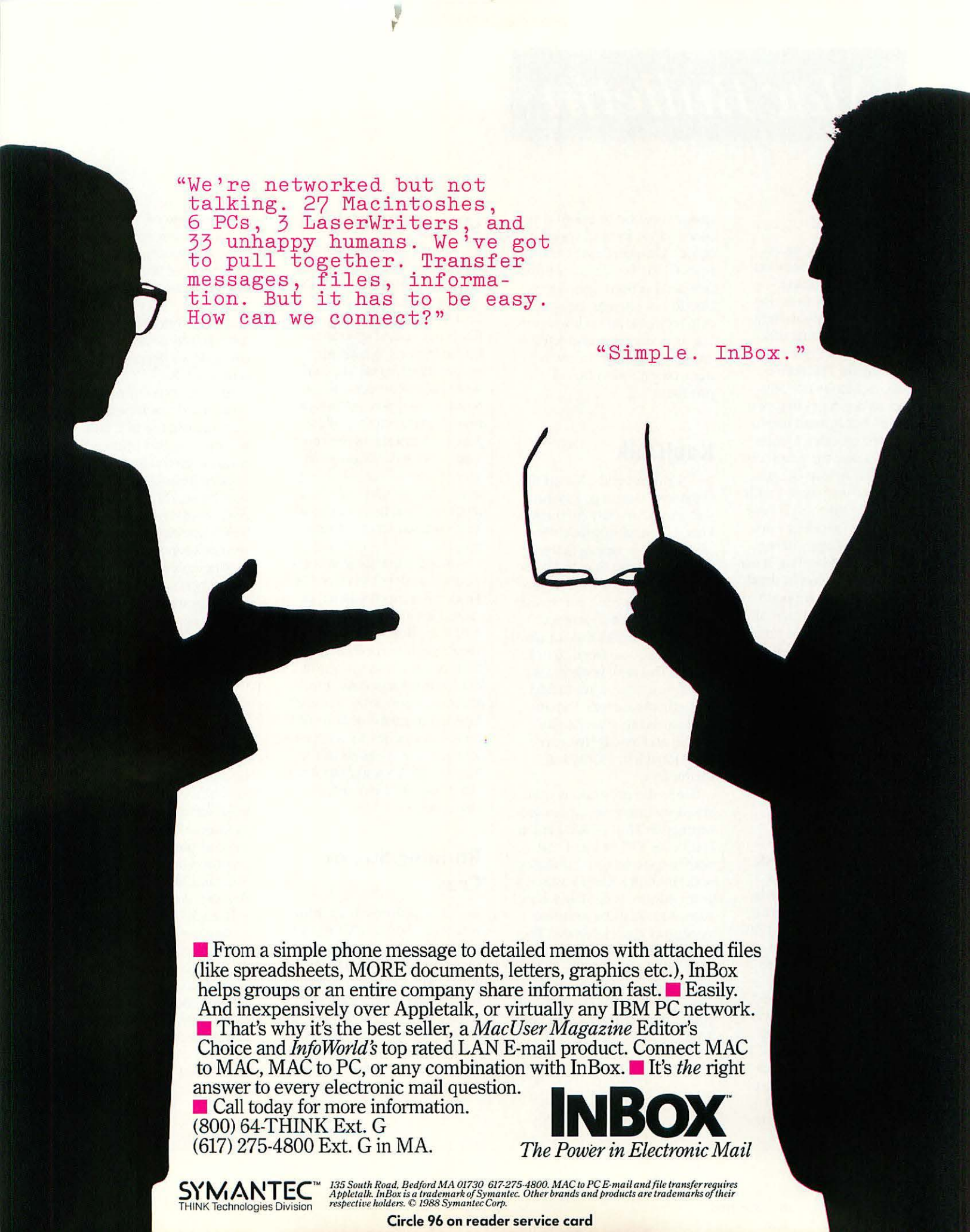
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Mac Bulletin

A Laptop Mac

► Apple has made more progress in design decisions for the laptop Mac. Apparently, it's settled on an active matrix, high-resolution, lightweight LCD screen manufactured by Hosiden Electronics of Osaka, Japan. The active matrix screen does not rely on wires to conduct current to each pixel, but instead uses a transistor to produce a faster screen response for graphics software. The laptop is battery operated and comes with a 68000 processor. You'll have a choice of two models: one with two 800K floppy drives, one with a 20MB internal hard disk. Although delays in product development have been attributed to the shortage of RAM, other issues have yet to be decided, such as whether to include a built-in modem, whether to use a mouse or trackball, and what software to include in the ROM. Mentioned prices vary from \$3000 to more than \$6000, fully configured.

QuickerDraw

► Andy Hertzfeld's QuickerDraw speeds up Apple's color QuickDraw routines by a factor of two to three, bringing notably faster color screen-imaging to the Mac. Apple plans to release an updated version of QuickerDraw after purchasing it from Hertzfeld, who owns the copyright and intends to post the released version on bulletin boards.

QuickerDraw could be especially important for 24-bit color—which suffers from slow imaging, since the entire

image must be redrawn three times (once for each primary color). QuickerDraw's routines triple the speed of 8-bits-per-pixel screen operations, but do not change the speed of 2-bit black-and-white operations. RasterOps and Radius are using QuickerDraw to demo their video board products.

KanjiTalk

► Until recently, KanjiTalk (Japanese language system software) ran only on the Mac Plus. The new upgrade version 2.0 now supports the Mac SE and the Mac II. KanjiTalk 2.0 shortens the conversion time required to translate keyboard input to screen fonts and shrinks the standard screen-font size from 16 to 12 pixels. The new version also gives you more ways to add and edit characters. Expansion cards are available for the SE and Mac II that carry additional kanji fonts and characters.

Since the program is quite memory intensive, Apple recommends 2MB of RAM and a hard disk. Other kanji software expected to be released soon includes Kanji PostScript from Adobe, PageMaker Kanji from Aldus, and a Japanese version of Quark XPress. The availability of KanjiTalk on the Mac SE and Mac II is expected to further Apple's entrance into the Japanese market, currently dominated by NEC and IBM.

Concerns for A/UX

► Amidst the enthusiasm for Apple's A/UX at UniForum, the semiannual UNIX conference and show, a closer look at the new operating system revealed several major limitations, which Apple representatives say they are working to correct. Although Sculley's keynote address focused on the virtues of the Mac user interface, the most notable of A/UX's missing pieces was a Finder-like application that would make UNIX as easy to navigate as the standard Macintosh operating system.

Among the improvements needed to develop an A/UX Finder is a mechanism that would let more than one A/UX application access the user-interface toolbox at a time, so multiple programs could simultaneously display their own windows. Another needed improvement would let A/UX applications access all the color routines in the Mac II's ROMs and read standard Mac HFS-formatted documents.

Running Sun or Cray

► The promise is exciting: running a Sun or a Cray, and its applications, from a relatively inexpensive Mac II. That's why people are debating various windowing systems that will give the Mac II a ticket into the world of workstations and supercomputers.

Fueling the debate are two manufacturers who have an-

nounced Macintosh versions of Sun's Network Extensible Window System, NeWS. Wedge Computer of Waltham, Massachusetts, offers a version of NeWS that runs under the Mac OS, while the San Francisco-based Grasshopper Group has a version that runs under A/UX.

Applications running on a networked machine like a Cray mainframe or a Sun workstation can open a NeWS window on the Mac. Remote applications then create images by sending PostScript commands over a network. NeWS manages windows as well as keyboard and mouse inputs, unlike Adobe's Display PostScript, which will have to be integrated into a windowing system to be successful.

Affordable Forms

► Baker Graphics, of New Bedford, Massachusetts, has produced a line of products aimed squarely at small businesses with moderate budgets. *BakerForms* pin-feed form software consists of four modules designed to perform the computing functions most common in small businesses: Accounts Receivable, Accounts Payable, Purchasing, and Payroll. Each of these modules is a *Microsoft Works* template—a ready-to-run application that uses the *Works* database module as its engine.

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(continues)

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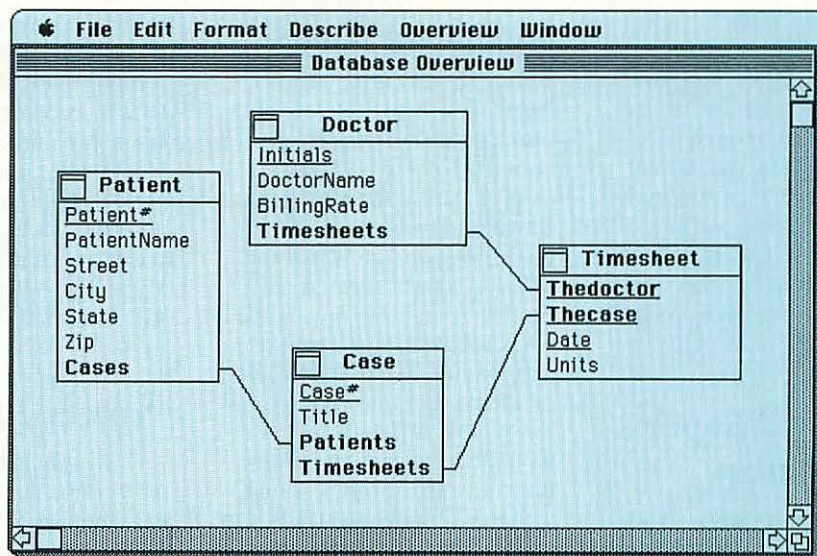
Many "database managers" are not much more than "list managers"—simple lists that can't connect and cross connect one item with another. So while they can "list," they can't really "manage."

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You simply draw connecting lines to relate one item to another.

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programmer or consultant. Each manual leads the user carefully through the steps that might trip up a computer neophyte: making backup disks, entering data, printing reports, converting from a manual accounting system, and so on.

Of course *Works*' own limitations constrain *BakerForms* somewhat, but Baker Graphics plans to take advantage of built-in macros if Microsoft adds them to the next Mac version of *Works*. All four *BakerForms* products are designed to print on ImageWriters using preprinted pin-feed checks and forms produced by Baker Graphics.

HyperCard Super Stack Contest

► *Macworld*, Apple Computer, and Bantam Books are in pursuit of excellent HyperCard stacks for the Super Stack contest they are jointly sponsoring. Expert judges will evaluate commercial, noncommercial, and custom stacks of all types and award prizes of Macintosh hardware and a special autographed, leather-bound edition of Danny Goodman's *The Complete HyperCard Handbook* to the developers of the most outstanding stacks. A feature story in the November issue of *Macworld* will spotlight the winners.

To enter, send clearly labeled disks, documentation (if necessary), and a one-page statement of the purpose and intended audience of your stack (you may include on that page mention of any special features you'd like to call to the attention of the judges) by June 15, 1988, to: Super Stacks, *Macworld*, 501 Second St., San Francisco, CA 94107. Entries, which will not be returned, may also be consid-

ered for "Your Best Stacks" in *Macworld News*. For additional details, send a stamped, self-addressed envelope to the same address, or look for the announcement in next month's *Macworld*.

Surprising Virus

► A HyperCard stack labeled New App Stack on computer bulletin boards contained a software *virus* that infected more than 1000 Mac downloaders. A virus is a piece of code that can sometimes delete files or create other havoc. New App Stack attracted attention, since it supposedly listed new Apple products due out in March. But when run, the stack would (unbeknownst to the user) install an Init resource into the active System file. On March 2, 1988, the one-year anniversary of the introduction of Apple's Mac II, the Init would cause a picture and message calling for world peace to appear on screen. The Init would remove itself on March 3. The peace virus is the brainchild of Richard Brandow, publisher of the Montreal-based *MacMag*. Brandow has claimed that programmer Drew Davidson spent a year testing the virus to ensure that it didn't damage files.

Scripting Buttons

► HyperCard programming for nonprogrammers has become a step easier, with Dan Shafer's push-button approach to programming. Script Expert provides a series of scripts for frequently needed instructions (such as click, end, add, find, do, sort, play, repeat) as well as for set-

ting properties like brush shape and number of decimals. You choose a script by pressing a button and answering questions. If you choose the arrow button, for example, Script Expert displays a screen of appropriate scripting buttons. As you respond to the questions, the script appears in a scrollable window. A magnifying glass takes you to full-screen size so you can see more of the script at once and change it more easily. Script Expert also includes an online help feature. For more information, contact HyperPress Publishing at 415/345-4620.

Project 2000

► To solicit ideas about new computers, Apple recently invited student teams from 12 universities to prepare papers that presented their conceptualization of the future of technology and personal computing. Alvin Toffler, Ray Bradbury, Diane Ravitch, Steve Wozniak, and Alan Kay formed the panel of judges that evaluated submissions. The University of Illinois in Champaign-Urbana won first place for "Tablet: Personal Computer of the Year 2000"—a paper describing a computer the size of a notebook, combining the powers of computation and communication. Second-place winners at Princeton University developed "The Apple PIE" (Personal Information Environment), which integrates radio, television, telephone, and other information technologies. "CORE," originated by University of Minnesota students, won third place. It lets users carry with them the primary functionality of their computer—memory, processing power, and accumulated knowledge.

AppleShare PC

► Apple is now shipping AppleShare PC, a program that runs on MS-DOS computers and gives them the ability to share files, applications, storage space, and information with the Mac, as well as print files on a LaserWriter transparently from within an MS-DOS application.

Using the AppleShare server from an MS-DOS PC is as easy as using a local disk drive. The AppleShare server appears to IBM PC users as a DOS drive and is accessed using standard DOS commands. If the file formats are common to both Apple and MS-DOS programs, like the WKS format for Lotus 1-2-3 and Excel, then information can be exchanged immediately between the MS-DOS and Macintosh computers. If the formats are different, then the files can be translated via Apple File Exchange. AppleShare PC works with the AppleTalk PC Card and requires a LocalTalk connector kit.

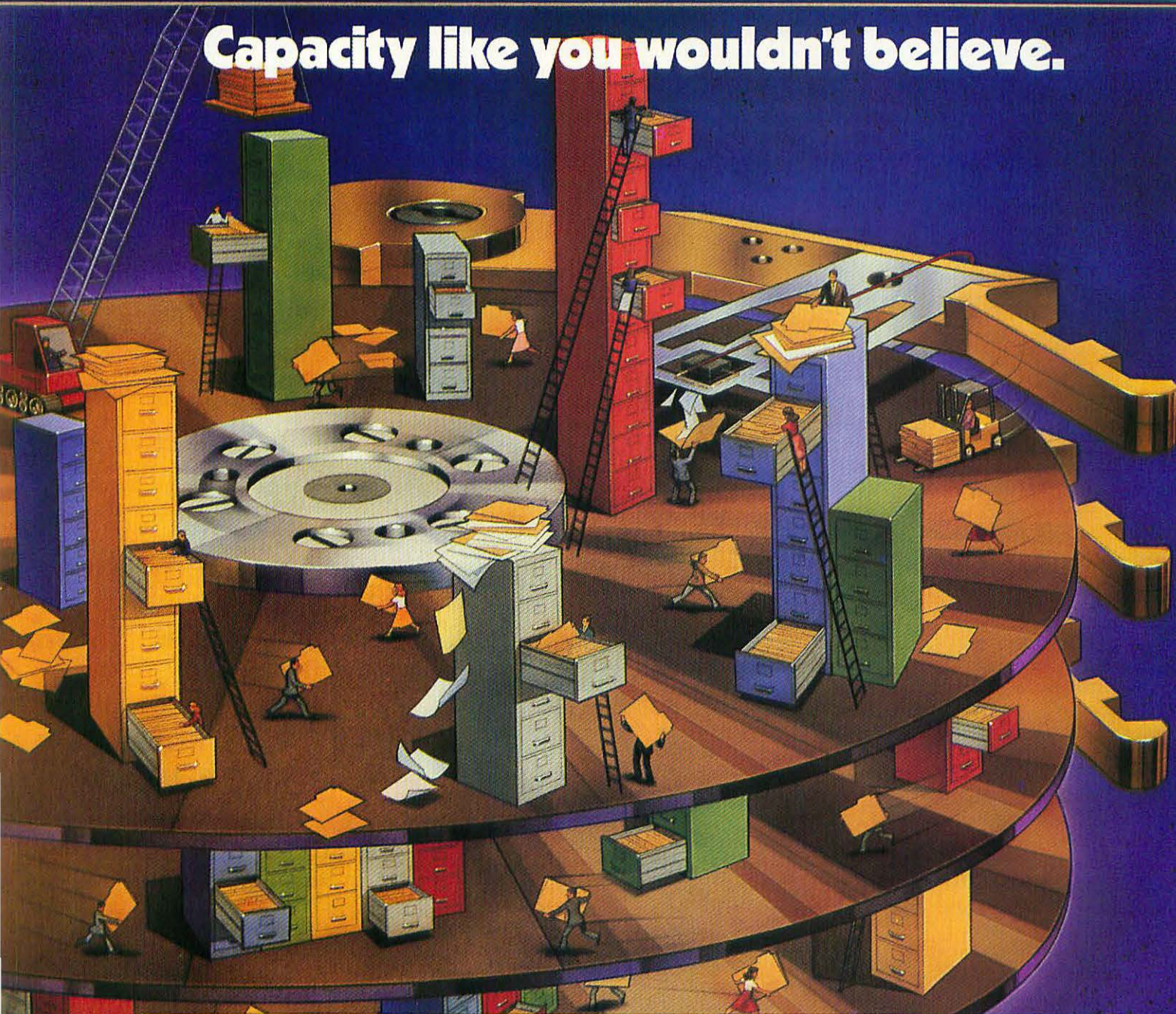
Fax It

► While we wait for Apple's fax modem to appear, Cygnet has been at work developing a similar product. Marketed by Abaton, the 12/48 Fax Modem combines the capabilities of a Hayes-compatible 1200-bps modem with a fax machine. A fax modem lets you upload and download files to another location that has a fax machine. Files that you send can be output at the other end by a fax thermal printer. Fax files can also be

(continues)

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printed on a LaserWriter, which produces a much higher quality final output than a thermal printer. You can send multiple documents to multiple destinations, and create a scrollable phone directory for frequently called sites. The Abaton modem supports MacPaint, PICT, and TIFF file formats, is compatible with Group III fax machines, and works across AppleTalk and TOPS networks so that a number of Macs can share a single Abaton fax modem. For more information, contact Abaton at 415/463-8822.

Financial Shortcuts

▶ People using Excel sometimes want quick answers. That's why MicroTemp's Financial Calculator offers 45 financial formulas commonly used by small businesses, real estate investors, financial planners, and individuals preparing budgets. You can quickly obtain answers to problems that involve calculations of monthly payments, interest rates, present and future values, rates of return, sales, income, break-even points, monthly cash flow, and amortization. The program builds templates for Microsoft Excel and Works that let you see all computation figures at one time. A user's manual explains how to customize the templates. For more information, call MicroTemp (707/575-1459).

AT&T Allies with Sun

▶ AT&T's newly acquired 15 percent stake in Sun Microsystems may strengthen the latter's competitive positioning, relative to the Mac II, as a high-powered workstation. At the same time, it strengthens AT&T's position in the mini-

computer market. Not only does the AT&T investment add credibility to Sun, but it brings additional capital for Sun's development of a unified UNIX operating system that will run on other computers, unlike the DEC and IBM proprietary systems. Sun also plans to release a computer based on the Intel 80386 chip.

Across the Board

▶ Access Technology has entered the Mac monopoly game and acquired two pieces on the board—Data Tailor's Trapeze spreadsheet and MindWork's MindWrite word processor.

Access Technology is best known for its integrated spreadsheet 20/20, which runs on computers made by DEC, Prime, Data General, AT&T, Wang, Sun, Apollo, and IBM. Similar to Lotus 1-2-3, 20/20 provides spreadsheet users with integrated graphics, project modeling, and database capabilities. The company doesn't plan to offer 20/20 for the Mac. While Access does not plan to incorporate MindWrite and Trapeze into 20/20, owners of 20/20 will be able to import MindWrite and Trapeze files. For more information, call Access Technology at 617/655-9191.

DTP Basics

▶ Recognizing that acquiring a tool doesn't mean you've acquired a skill, Adobe Systems and Invision now offer programs to teach the basics of typography and design to desktop publishers. Three of the Adobe Type Library Pub-

lishing Packs provide typefaces and design tips for desktop publishers who prepare newsletters, forms and reports, and displays and presentations. The first product to ship, Publishing Pack 1: Newsletters, costs \$395 (the full set of three packs is expected to cost \$605) and includes three typeface families and suggestions on how to use type in newsletters.

Invision's Design Sense comes with a videotape that covers basic design elements, type fonts, and the steps in putting together a newsletter. It also identifies common typesetting errors. For more information, contact Adobe Systems at 415/961-4400 or Invision at 617/444-4060.

Faster and Cheaper

▶ Until now, souping up the SE with an accelerator board has cost anywhere from \$599 to \$1299 (MacMemory \$599, MacPeak Orion \$795, Dove \$899, Radius \$995, General Computer \$1299). SuperMac has driven the prices down further with its introduction of SpeedCard, an SE accelerator board priced at \$399. SpeedCard's 16-MHz 68000 processor doubles the processing speed of the 8-MHz SE. While the card's performance is due in part to the processor, it's primarily the 16K hardware RAM cache that permits significant speed improvements by storing frequently used instructions and data. SuperMac also offers a 16-bit expansion bus (\$149) that lets you add another SE expansion card. To further enhance the system, you can purchase a 68881 16-MHz math coprocessor with the SpeedCard (\$699 for both). For more information, call SuperMac at 415/964-8884.

Digitizing in Color

▶ Rather than reconstruct an image with your color paint program, you can scan color images directly to the Mac. Sharp's JX-450 is a 300-dpi scanner that reads four-color artwork. It offers 64 shade gradations with 260,000 shades. The unit can also be used as a gray-scale scanner. It accepts up to 11-by-17-inch page scans and also scans 35mm film and overhead projection transparencies with an optional mirror unit. To output your image, you can use Sharp's JX-550 color thermal-transfer printer. LaserPaint-Color II, from LaserWare, can drive the Sharp Scanner. It captures up to 24-bit images, which you can then edit in the program and print as four-color separations. For more information, call 800/237-4277.

Animation in HyperCard

▶ MacroMind, of VideoWorks fame, now gives HyperCard stackware developers a way to perk up their lifeless stacks with the recent release of VideoWorks II HyperCard Driver. The driver unites the two development environments: it lets you create a database of animation and sound documents, and it adds color and full-screen documents to stacks. It installs with the click of a button and includes online help. Available through Brøderbund (415/492-3200), the VideoWorks II HyperCard Driver retails for \$99.95. □

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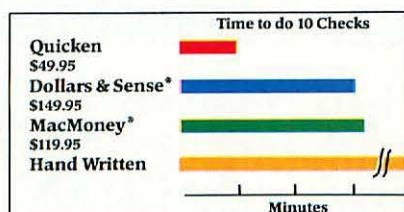
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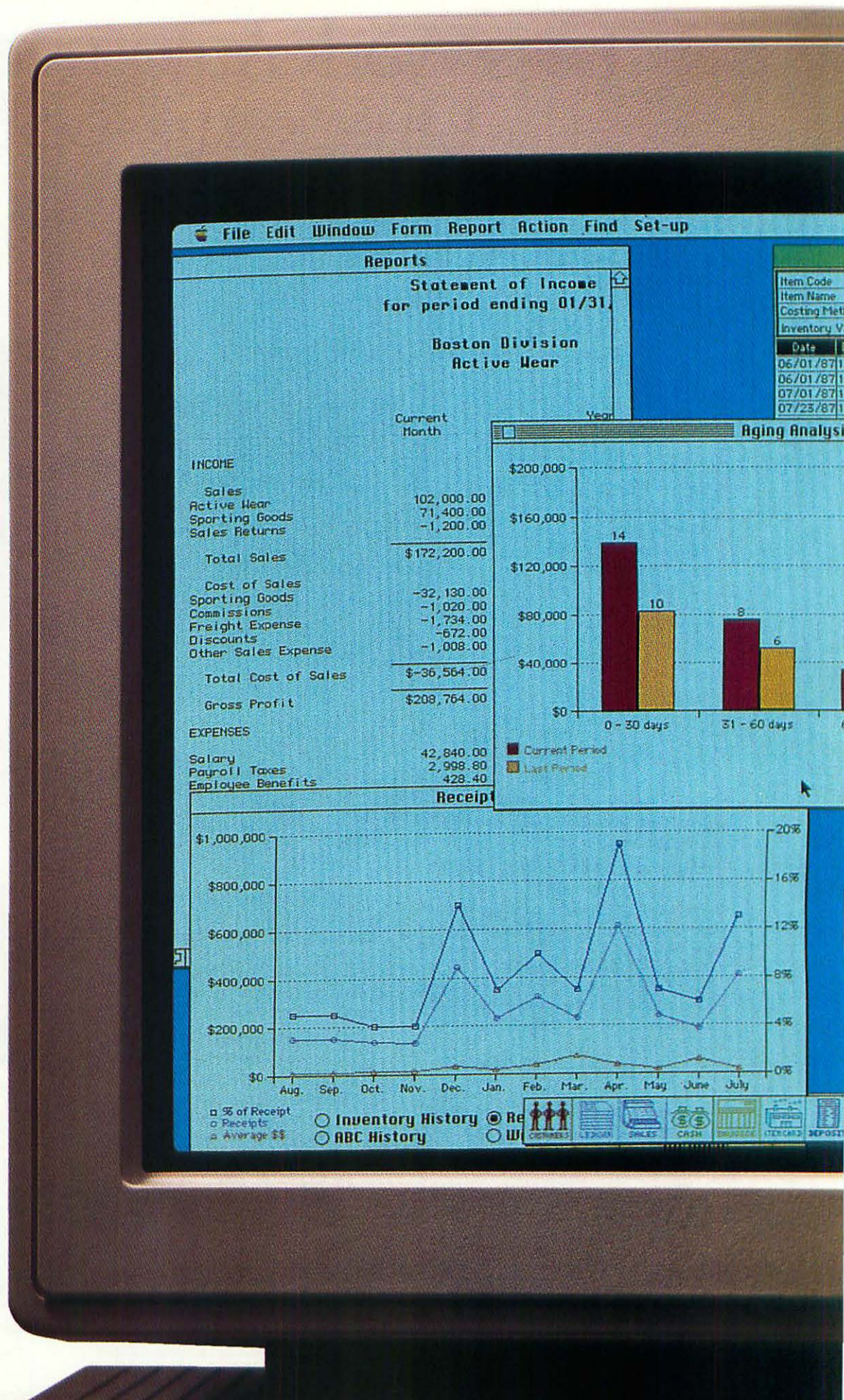
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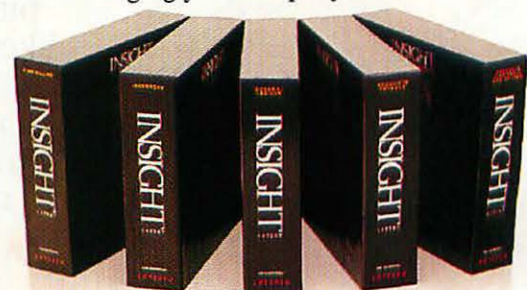
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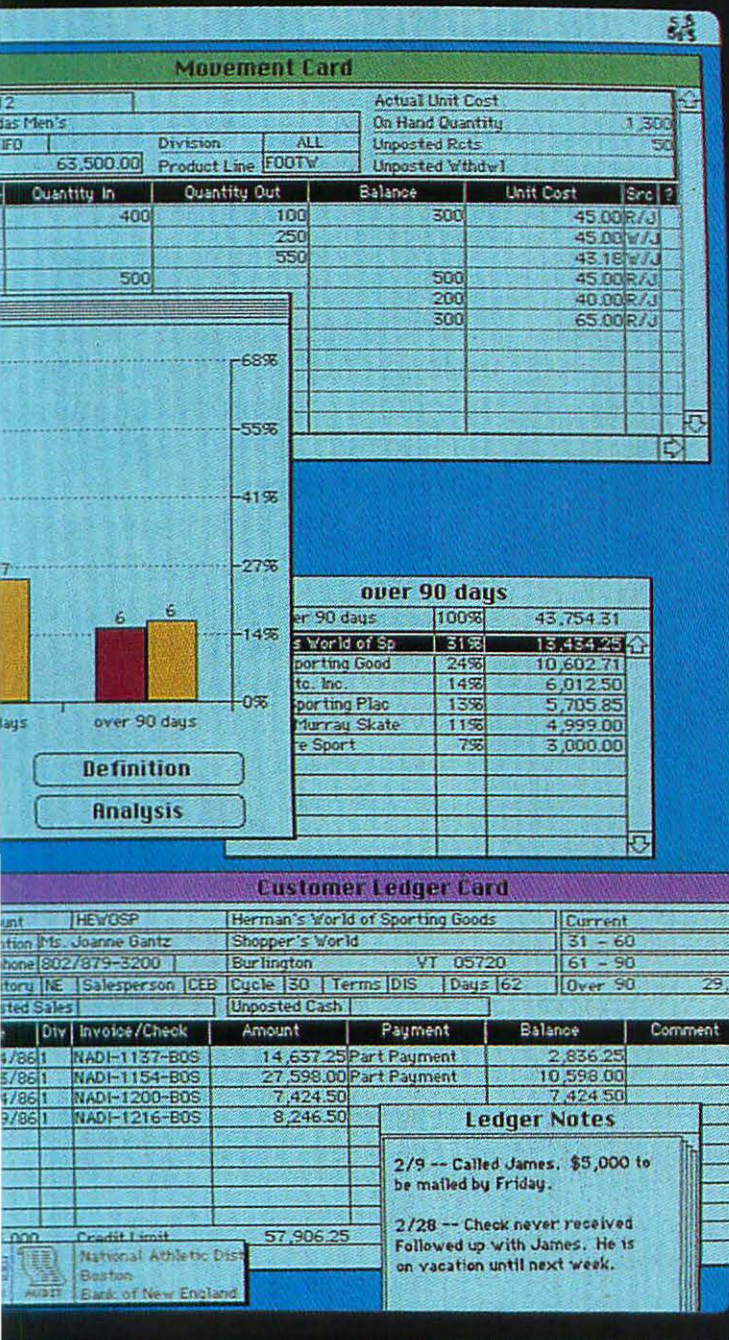
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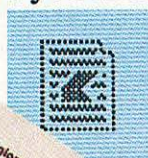
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TECHNICAL PAPER

kind of delay potentially unaffordable. A single such delay could not only wipe out the savings of these tires on that unit, it could lose a valued, profitable customer, thereby substantially reducing revenue.

Low Aspect Ratio tires are another solution. These tires cannot be used on steel wheels due to their lateral wall irregularities caused by light loading. Flaws therefore would have to be purchased a conventional type of tire for the steering positions. The problem with that is retreads are not generally used on steering axles and the other position.

Handling today's trucks with wide-base singles is also costly from a purchase tax standpoint. Since the Federal Excise Tax (FET) for a 213-pound 10.00R22.5 is \$71.50, the total purchase price of the wide-base standard radial, is now much closer to the cost of two low profile tires whose total FET is \$48.00. The small price advantage, as well as some of the cost savings of the wide-base singles, can be more than offset currently by the added cost of the special axles and wheels they require.

Wide-base singles may be the tire configuration of the future. New materials and constructions could increase their volume while new tread designs and components may reduce their disadvantages. Should a self-

able, self-sealing liner be developed to eliminate equipment downtime and freight delays, the acceptance of this type tire would be appreciably accelerated.

To summarize, the following is what we consider realistic and achievable in five to ten years:

Low Aspect Ratio Tires: These most exhibit reduced rolling resistance, weight and size to increase vehicle payload and decrease fuel consumption. Fleet operators will want to choose between dual low profile tires for other than steering positions or low aspect ratio wide-base singles, which offer further advantages in weight and rolling resistance over dual low profile tires.

Hardware for Low Aspect Ratio Tires: In order to maximize these tires' performance, truck manufacturers must design equipment to fully accommodate the smaller diameter tires. As soon as practical, suspensions must be redesigned to be compatible with the springing characteristics of radial tires. Reduced tire size may also create a need for redesigned transmission and drive axle gearing.

Hardware for Wide-Base Tires: Axles will have to be lengthened to accommodate these tires correctly under 110% wheel trailers. The added room afforded may provide for more design creativity in the trailer and sus-



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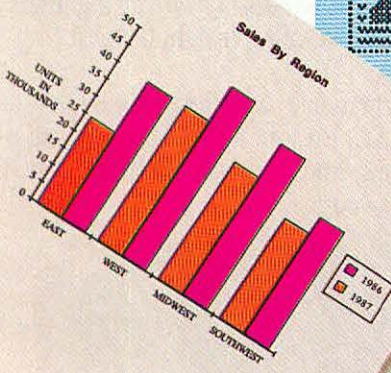
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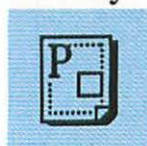
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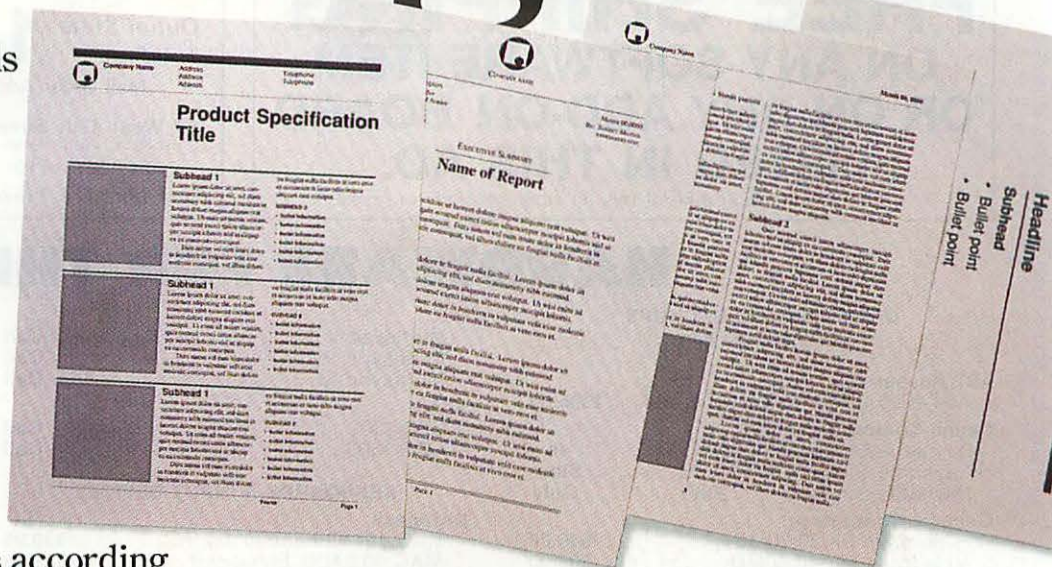
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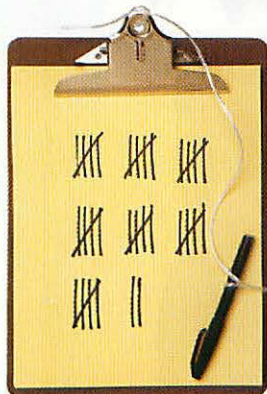
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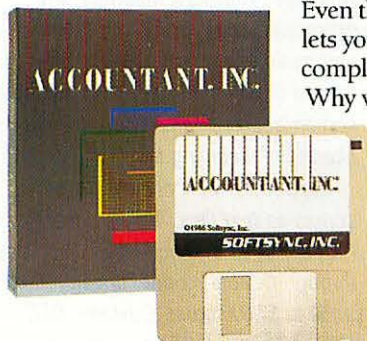
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"MicroPhone . . . sets the standards that general-purpose communications software will have to follow."

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SOFTWARE
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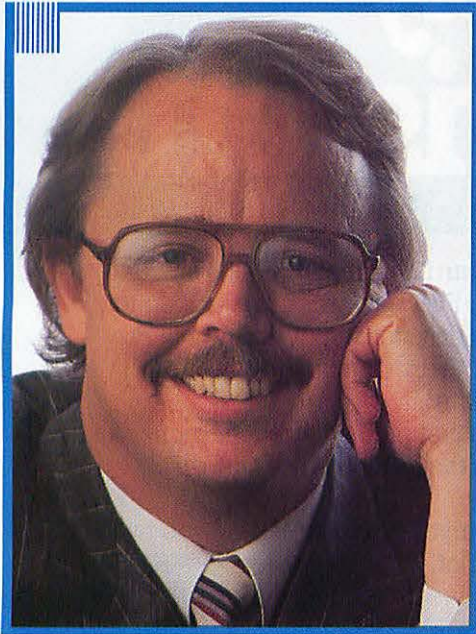
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A Peek at the Laguna



*A leak leads to
a look at Apple's new
portable Macintosh.
Here's looking at you,
Laguna*

Our sister publication, newsweekly *Macintosh Today*, recently scooped every other Mac periodical. An unidentified Apple employee provided a free-lance writer with a copy of a very confidential 160-page report.

What a leak! The report revealed all the technical specs on Apple's prototype of a 12-pound Macintosh SE portable computer code-named Laguna.

Obviously, monthly magazines like *Macworld* differ from news publications like *Macintosh Today*. For one thing, being monthly, *Macworld* has a much longer lead time. In order to view products ahead of their release dates, we often work under a nondisclosure agreement with Apple and with other developers. In this way, we can test the hardware or software adequately and still publish articles to coincide with a product's appearance on the market. By contrast, the news-oriented *Macintosh Today* staff maintains a strict editorial policy of refusing to sign nondisclosures. Their interest is in news as it breaks.

After the Laguna story broke, some inevitable questions were raised: will the leak damage Apple? Will it hurt the Laguna's development? Traditionally, information leaks affect a company's sales, stock prices, and deals in the works. Certain companies deliberately leak information to the press—or "preannounce" a product. IBM often announces its new products as much as a year or two before the actual delivery date, as it did with the Extended OS/2 operating system for its PS/2 line of PCs.

This is a marketing strategy designed to create anticipation for future products; it also tends to freeze customer purchases of competitors' products.

But the recent leak may be different from all other leaks. It was not a deliberate preannouncement on Apple's part. Some disgruntled Apple staffer—or perhaps a third-party developer—took it upon him- or herself to release the highly confidential Laguna report to the world.

Furthermore, this early news of an exciting, but anticipated, development is not likely to benefit any of Apple's competitors. After all, no one is making Macintosh

clones. How could anyone be developing a rival Macintosh laptop?

It's not likely that the laptop leak will hurt Macintosh sales, either. If the Laguna were a new desktop computer with more capabilities than the current line of Macs, users might quit buying them and wait for the new machine.

But since it's a laptop, that's not likely to occur. Most people who own laptops already have desktop computers. A portable is usually the second computer you acquire. It's the one you take on trips, or to meetings. So the biggest market for the Laguna is likely to be those people who already own Macintoshes.

While I doubt that Apple engineered its own leak, I do think the Laguna affair will actually benefit the company. Macintosh users who really want to buy a portable computer will probably prefer a Macintosh to the existing MS-DOS laptops. If anything, the leak may hurt some of the laptop makers, like Toshiba and Zenith, who are making a killing in this \$1 billion market.

Now that the secret of the Laguna is out, I must say that it looks like a very exciting product—I can't wait to get my hands on one. One feature I really like is the proposed trackball input device, which you would use instead of a mouse to control the cursors.

In addition, the 1-megabyte static RAM machine features a 16-MHz 68HC000 chip that is twice as fast as the 68000 chip an SE sports. Yet the new chip consumes only one-tenth of the power. At 12 pounds, the Laguna is truly a lightweight portable. The lead-acid battery inside weighs 5 pounds, but it can run up to eight hours before it needs recharging. Most MS-DOS laptops run for only two or three hours before their batteries go dead.

Some additional specs: the Laguna uses one or two 2MB 3½-inch double-sided drives. Apple plans to offer an optional compact CMOS Hayes-compatible

(continues)

You have to be crazy to buy Business Filevision.

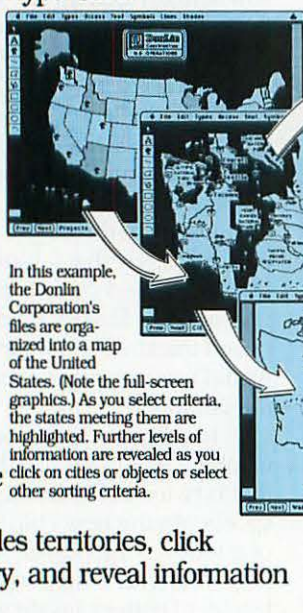
Crazy 3M. Crazy Ford. Crazy DuPont. Crazy Boeing. Crazy Sears. Crazy Westinghouse. Crazy Apple.

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In this example, the Donlin Corporation's files are organized into a map of the United States. (Note the full-screen graphics.) As you select criteria, the states meeting them are highlighted. Further levels of information are revealed as you click on cities or objects or select other sorting criteria.

More important, unlike other programs that seem to do similar things, it allows you to select several criteria so that you can sort and analyze data 'behind' the images. You can incorporate computed fields and statistics. And you get real flexibility in

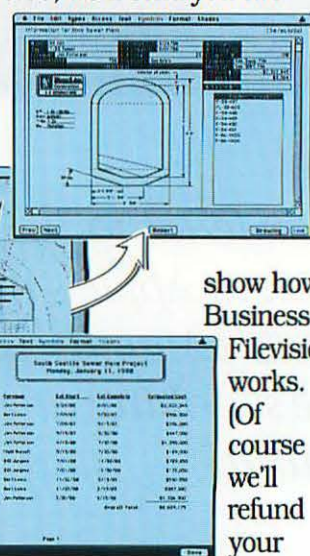
reporting. All without learning a programming language.

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The Big Picture CX showing color CAD drawing.



The Big Picture with Double Feature software displaying word processing and spreadsheet.



The Big Picture C20 displaying a color scan photograph.



The Big Picture for the Macintosh II showing Excel™ spreadsheet.



DoubleColor card showing full page presentation running on NEC Multisync™ Plus.



The Big Picture IQ™ photographic image quality grey scale monitor.



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David Bunnell

modem that fits inside the Laguna's CPU. (It can handle 300, 1200, and 2400 bits per second.) The laptop also comes with terrific graphics and sound. In fact, it features the same sound chip as the Mac II.

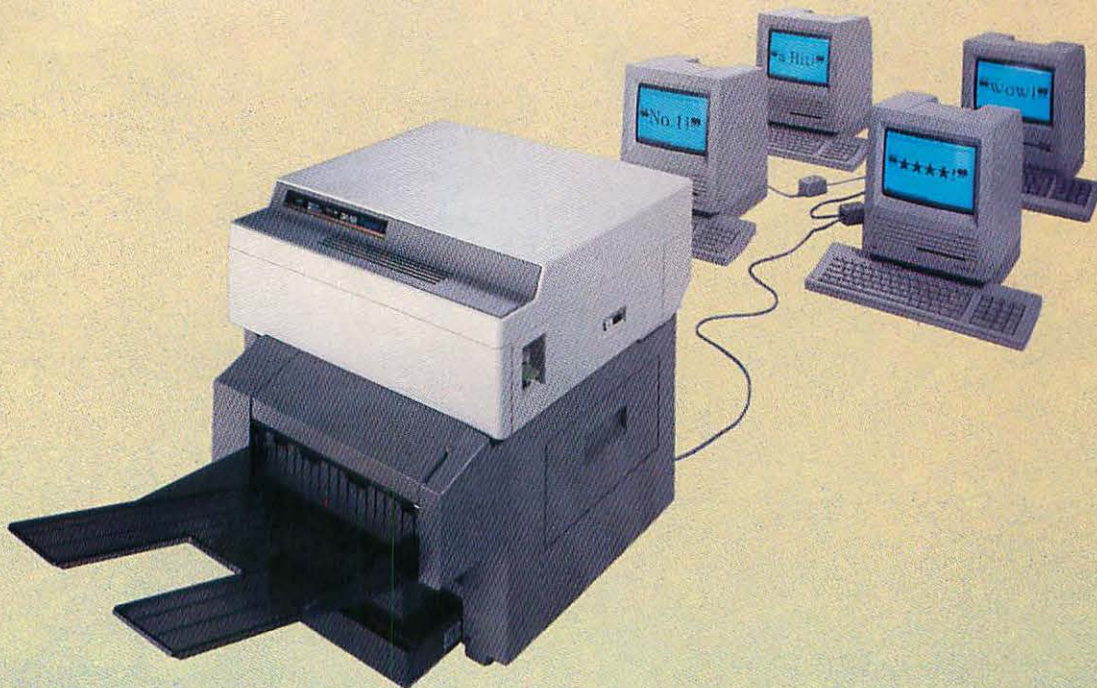
One of the biggest problems with current portable computers is the display technology. The screens simply aren't as readable as they should be. Existing technology requires time-consuming multiplexing of many electrical wires to maintain the display, even at low resolutions. The Mac laptop will have an active matrix screen—the first for a computer. Active matrix uses very few input wires. It turns individual pixels on and off with transistors just the way a memory chip turns its bits on and off. The Laguna's specs call for a 9½-inch reflective flat-panel screen, with an incredible 640-by-400-pixel resolution. (In contrast, the resolution on the SE is 512 by 342 pixels.)

Maybe Apple has come up with an innovative solution to the perennial flat-screen problem. On the other hand, the manufacturing cost for active matrix screens is very high—at least \$500 to \$1000 per screen, even in quantity. We don't know if Apple has found some magic way of obtaining them for less, but it will still have to purchase them from outside.

Because of the screen cost and the advanced nature of the machine overall, the Laguna may end up being a pretty expensive piece of hardware, possibly retailing for about \$6000. It's not clear to me how many people would actually be willing to pay such a premium price for a laptop—even a Macintosh laptop. Until the prices start to come down (probably two or three years after its introduction), the Laguna may well be the laptop "for the rich of us."

Even so, I think the machine marks the next big step along the way to realizing the vision of the Dynabook portable computer, which Apple Fellow Alan Kay has been talking about for years. In the not-very-distant future, we're going to have computers we can carry around like books. We'll just open our notebook-size personal computers, and one side will have a keyboard and a trackball; the other side will hold the screen. These machines will be extremely lightweight. You'll be able to take them anywhere.

Until that wonderful day, I do wish I knew when—and if—the Laguna will be out on the market. John Sculley, won't you call and tell me the details? I won't tell a soul, I promise. I can keep a secret. □



The PostScript laser printer sure to get high ratings at its network debut.

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Type casting The QMS-PS 800 II comes with 35 resident typefaces (you can download more if you like). PostScript allows you to scale type to virtually any size, from minuscule to mammoth. PostScript also enables you to design, and redesign, your documents with exacting detail. You have total control over the final appearance of documents, with the ability to place text and graphics anywhere on the page. In short, you get the complete desktop publishing power that only PostScript can give you.

Critical acclaim The QMS-PS 800 II is certain to receive rave reviews on your network. And for a single-user set-up, there's the QMS-PS 810 laser printer. For a demonstration of either, call **1-800-523-2696** for the location of the Laser Connection dealer nearest you. And be sure to ask for *The Sourcebook*™ – our exclusive catalog filled with the latest laser printer products and enhancements.

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And you can expect to see some very powerful new "AppleShare Aware" multi-user and multi-launch programs by software companies like Microsoft and Aldus.

The AppleShare file server also offers you a "waste not" upgrade path. Small workgroups can start on a Macintosh Plus or SE. When the network's needs expand, transfer the server to a Macintosh II. And put the other Macintosh back to work as an individual workstation.

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Letters

A forum for Macworld readers

Of Time and Space

In David Bunnell's column "The Second Coming of Steve Jobs" (January 1988), he refers to the Macintosh as "four light-years old." Light-years is a measure of distance, not time. A blunder like this is light-years below the technical level at which *Macworld's* writing should be.

Doug Currie
Londonderry, New Hampshire

David Bunnell responds: "You're right, I was wrong. Time isn't distance; it's actually money."

Credit Where Credit Is Due

In his January 1988 editorial, David Bunnell says that "the mouse, *Windows*, pull-down menus, and the graphics interface were invented at Xerox PARC." Wrong. The mouse and windowing were developed by Doug Engelbart and the talented group he worked with at SRI International in the sixties and early seventies. No one should question the tremendous contributions made by PARC and Apple, but it all started with Doug. It's high time his efforts were recognized.

David A. Potter
Princeton, New Jersey

Corrections

The mystery woman in the photograph accompanying "Mac Business Tools" (February 1988, page 291) is Lisa R. Burton of Ventura, California, a certified forms consultant who uses the Mac to produce complex forms for her clients.

MacNosy (mentioned in Reviews, February 1988, page 203) is not shareware; it's sold by Jasik Designs (415/322-1386) for \$90, \$170 with a debugger. The Mac II version is \$350.

A point well taken. Doug Engelbart definitely deserves recognition for his pioneering contributions to personal computing. In fact, we featured him in two previous *Macworld* articles: "The Macintosh Family Tree" (November 1984) and "Hypermedia" (March 1986).—Ed.

Clarifying Addresses

One item in your review of Desktop Express (Reviews, October 1987) needs clarifying. When you prepare to send mail to an address you're unsure of, before logging on to MCI Mail you should uncheck the Automatic Send/Receive checkbox and then watch for any incorrect addresses to be displayed. You can either select one of the alternate choices (each address can have up

to 20) or skip over it to ensure that the other addressees receive the message.

Greg Gerdy
Dow Jones & Company
Princeton, New Jersey

Well, that neatly dispenses with the "one major flaw" we found in Desktop Express. Sorry for the oversight.—Ed.

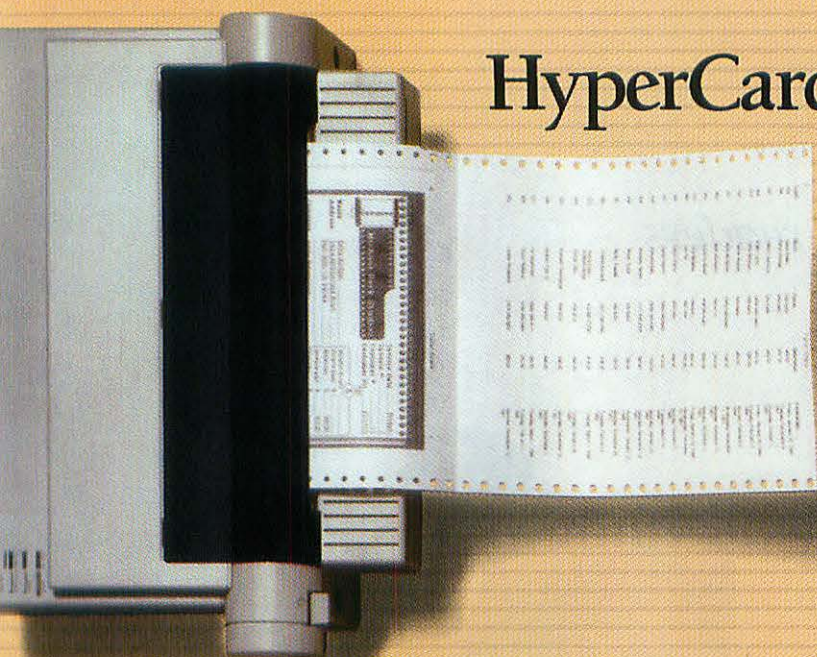
Tracking Updates

Your review of Time Logger 2.11 (Reviews, November 1987) compared that product to an outdated version of ours, MacInUse 1.0.

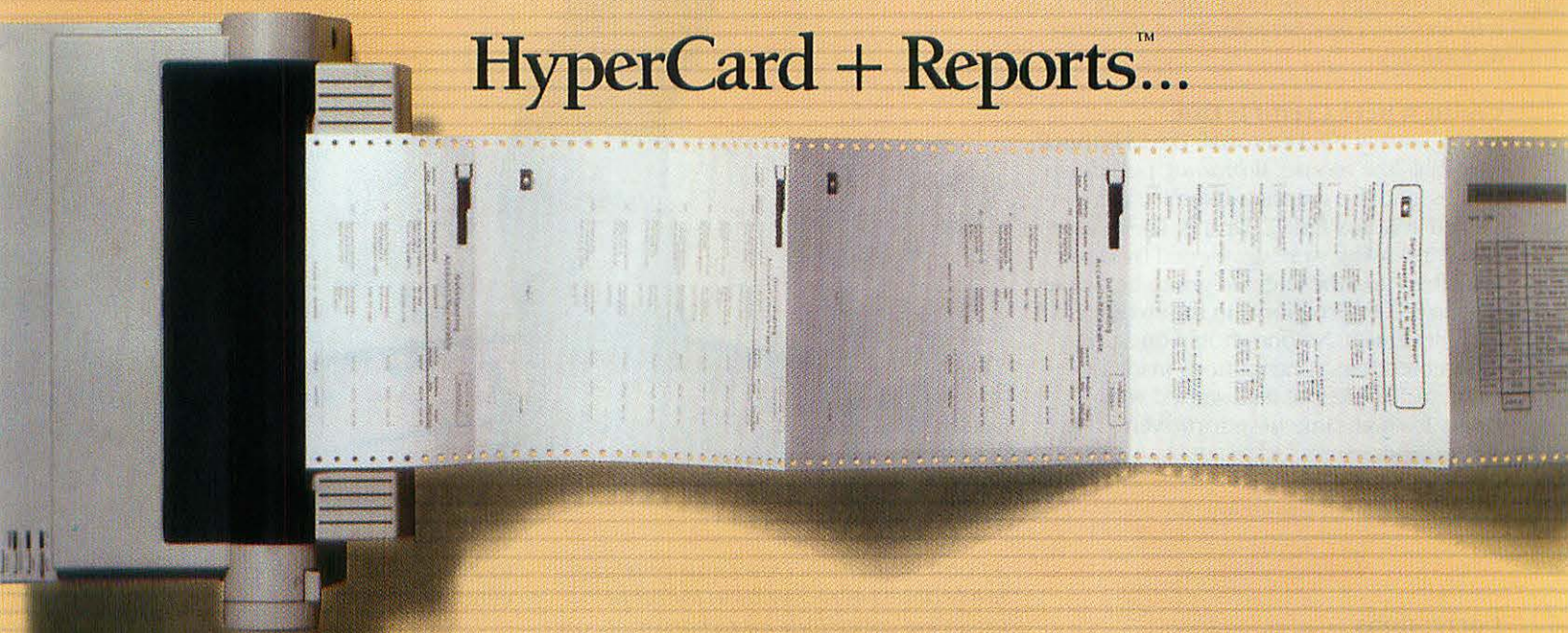
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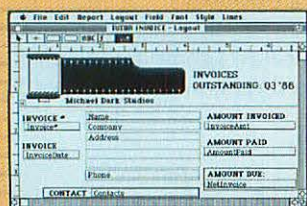
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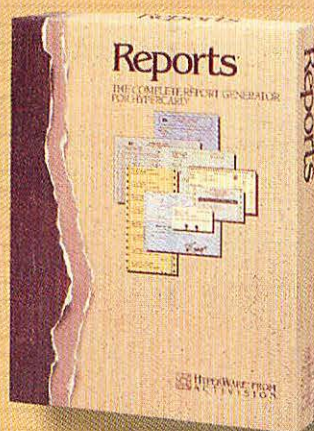
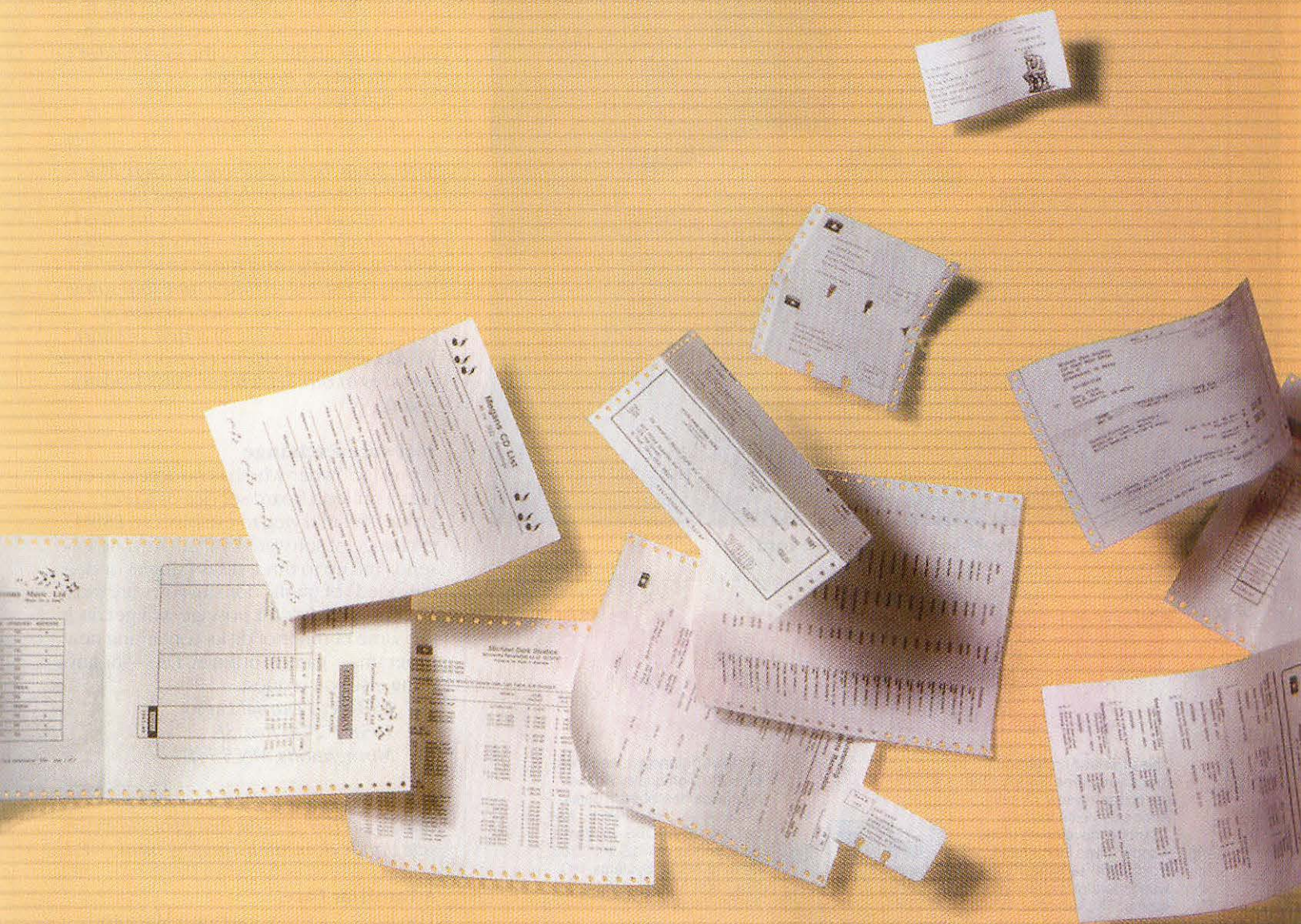
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Letters

The current version of MacInUse (2.0) tracks time in the Finder and provides additional Finder information. It also has an F-key feature that allows writing to the file, even within an application. You can access the MacInUse log file with a manual procedure similar to Time Logger's. Only if you're using MacInUse's predefined templates must all files be in the same folder.

Michael A. Bonnice
SoftView, Inc.
Camarillo, California

At the time the review was written, MacInUse 1.0 was the only released version. Unfortunately, the procedures involved in producing a review—product testing, writing, editing, and magazine production—consume so much time that sometimes a review of an older version appears after the release of a new version. We did, however, report version 2.0's new features in our September 1987 Updates.
—Ed.

Software Exchange

I'm a Mac owner who has no access to either a bulletin board service or a user group, so I'm trying to establish an ESBM: exchange of software by mail. Anyone who sends me up to three disks (single- or double-sided) of public domain software plus 39 cents per disk for postage will get back the same number of disks containing new programs—games, utilities, DAs—or anything else you request.

ESBM c/o Daniel Levy
1058-F 27th Ave. SE
Minneapolis, MN 55414

See "Users Friendly" in this issue for names of user groups that provide extensive public domain listings by mail. —Ed.

A Familiar Face

The latest TV show starring a Macintosh: "MacGyver" on ABC. An episode I saw featured an SE running Mac-a-Mug that was hooked up to an ImageWriter II—and best of all, they actually used it.

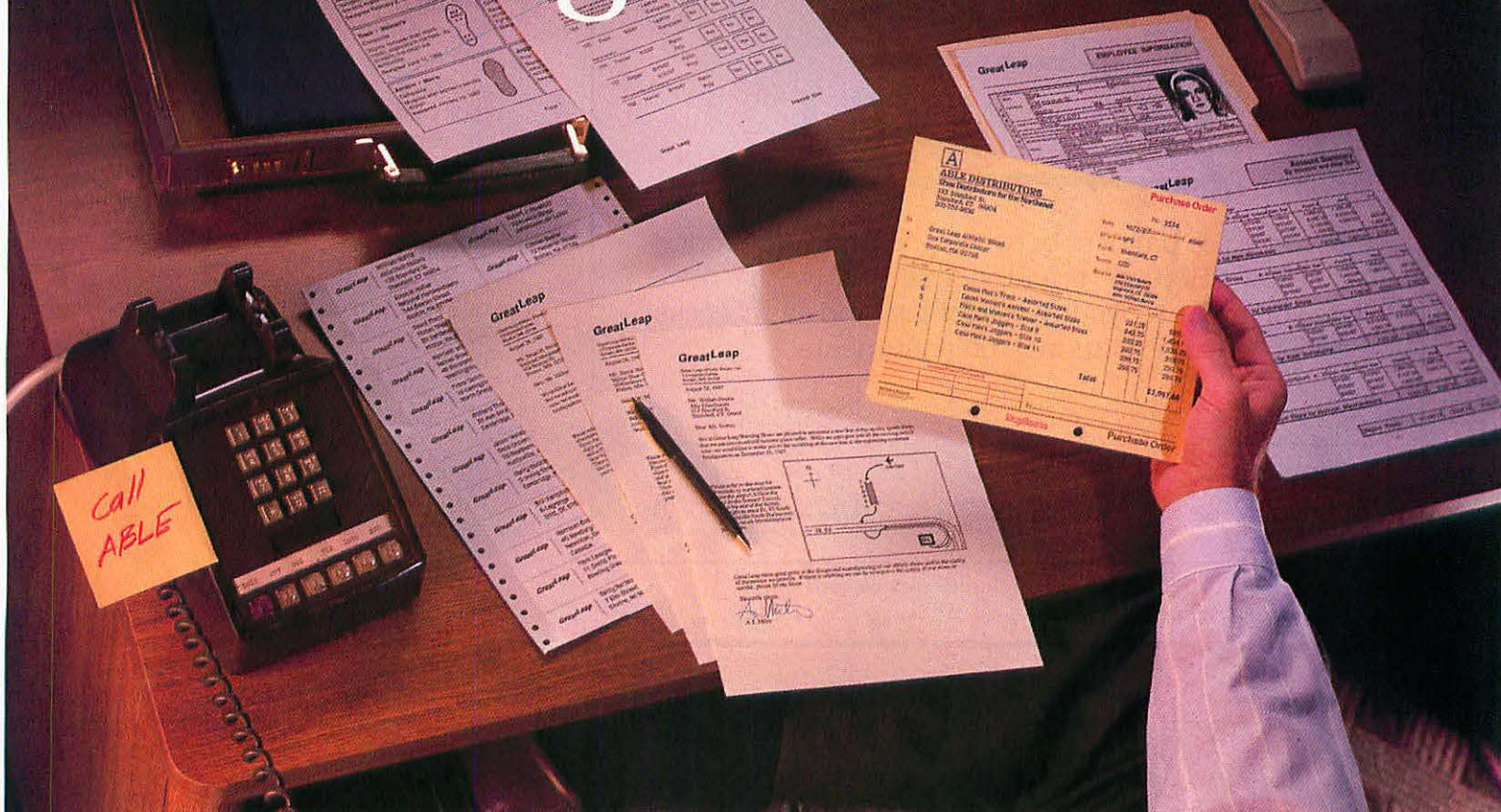
Lloyd J. Quелlette
Kenai, Alaska

Designer Charts

Michael Alexander's excellent "Mac Charting Tools" in the January 1988 issue not only described how to get the most out of Excel's charting capabilities but also devoted much space to good graphic design.

(continues)

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FileMaker Plus makes managing your data base just as easy. It automatically indexes every word, number and date you enter. You can look up pricing information and quickly calculate, sort, and summarize your invoices, automate your sales reports, produce contact lists, form letters, and mailing labels. All from the same data, without retyping. You can also exchange information with other applications, like Microsoft® Word, Excel, MacWrite®, MacPaint™, and MacDraw™ to help you share information and formats.

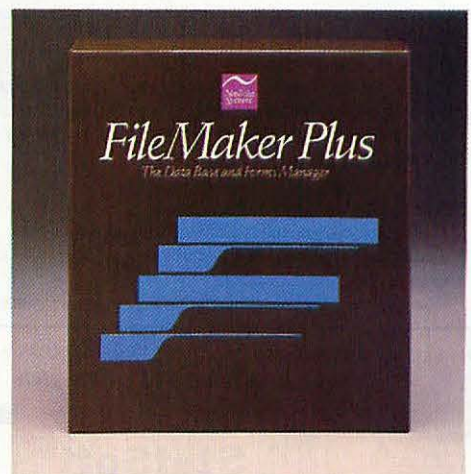
And FileMaker Plus is on friendly terms with the entire Macintosh family, including the Macintosh 512K, Macintosh Plus, Macintosh SE as well as the Macintosh II, the ImageWriter® II and LaserWriter® Plus, and the latest system software, such as MultiFinder™ and AppleShare.™

Nashoba Systems is just as committed to FileMaker Plus today as we were when we first developed it. We'll continue to do all the things that have made it such a success: listen to our customers, provide outstanding free technical support, upgrade our product with the most advanced technology in an easily accessible form, and assure your satisfaction

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Letters

Another worthwhile source on that topic is Edward R. Tufte's *The Visual Display of Quantitative Information*, available for \$34 from Graphic Press, Box 430, Cheshire, CT 06410.

Richard S. Russell
Madison, Wisconsin

Going Downhill

The colorful "Racing Downhill" chart ("Mac Charting Tools," January 1988) is a glaring example of the carelessness the author cautions against. Because the times in the vertical axis were labeled in minutes rather than seconds, the Olympic skiers appear to have raced down the slopes about 60 times more slowly than they actually did.

As graphic artists, if we don't strive to raise our professional standards, what we see racing downhill might just be our credibility as visual communicators.

Stephen Sedam
Mountain View, California

Right. A tip we left out: always proofread your charts again after final pasteup.
—Ed.

A Database for the Masses

I suspect that many critics of Ashton-Tate's dBase Mac are earning megabucks developing accounting, inventory, and other applications using dBase III Plus on the PC, and have similar aspirations for the Mac. The majority of database users are not application developers but secretaries and clerical workers who must consult a programmer every time they're asked to produce a new type of report.

What I first saw of dBase Mac convinced me that it might actually be a database for the end user rather than a gold mine for the programmer. As an MIS manager, I'd rather my clerical help were able to create their own databases and specialized reports; and as head of microcomputer support, I'd like to know how well each of the Mac database packages rates from the user's perspective.

Ann Albach Meyer
Austin, Texas

As you suggest, dBase Mac seems to be geared more to the average user than the developer (see Reviews, March 1988). We'll be running features on file managers and relational databases in upcoming issues. —Ed.

(continues)

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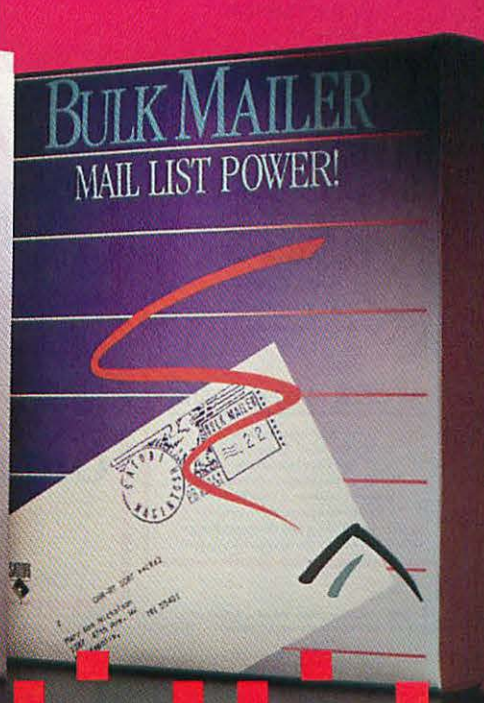
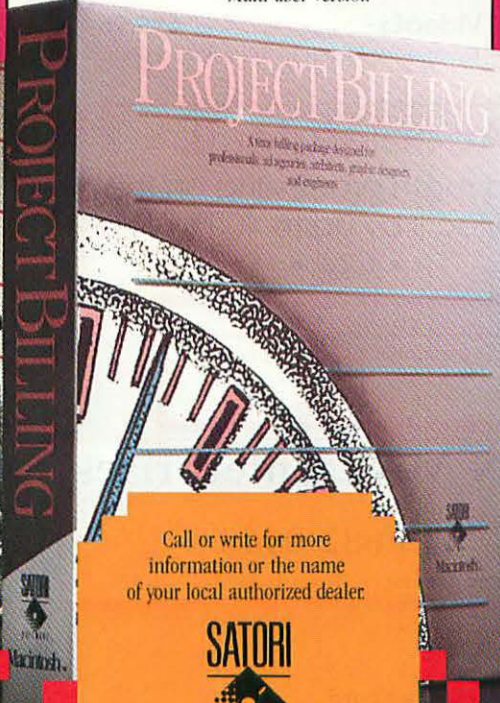
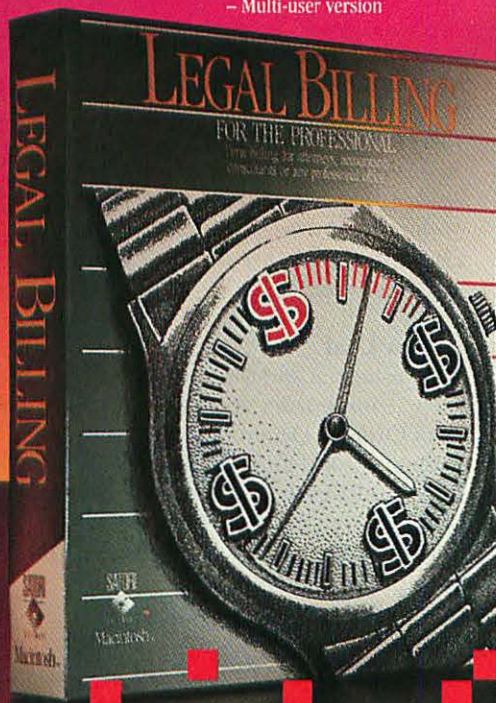
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Letters

Memory and MultiFinder

In *Commentary* (January 1988) Jerry Borrell mentioned that when he's using MultiFinder, MacCalc frequently quits with an Out of Memory error message. MacCalc is able to use all available memory and may be loaded in any part of RAM by Switcher or MultiFinder. Had he called our technical support line, he would have discovered that a MultiFinder-compatible version of our product is available free to all registered users [see *Updates*, this issue].

Richard A. Ross
Bravo Technologies
Berkeley, California

Our intent was not to criticize MacCalc but to warn our readers of the memory problems they're likely to encounter running applications under MultiFinder.
—Ed.

Scrutinizing Scanners

Jim Morton's informative look at the gray-scale capabilities of scanners ("Shades of Gray," January 1988) contains several inaccuracies about our products. First, our MacImage 2.0 image-processing software runs on all our user-oriented scanners, not just the high-end models. Second, the Model 840 costs \$4800 (not \$8995) and is capable of 400-dots-per-inch resolution. We do offer an OEM-oriented scanner plus software, Model 840i, for \$8995, as well as a midrange 300-dpi scanner, Model 830, for \$2800. Also, we reduced the JetReader's price from \$1300 to \$800 last October.

Charles R. Joseph
Datacopy Corporation
Mountain View, California

Jim Morton completed the features table just after the 840 line of scanners was announced; a footnote indicated that some prices and specifications might change. Thanks for setting the record straight.—Ed.

A New Leaf

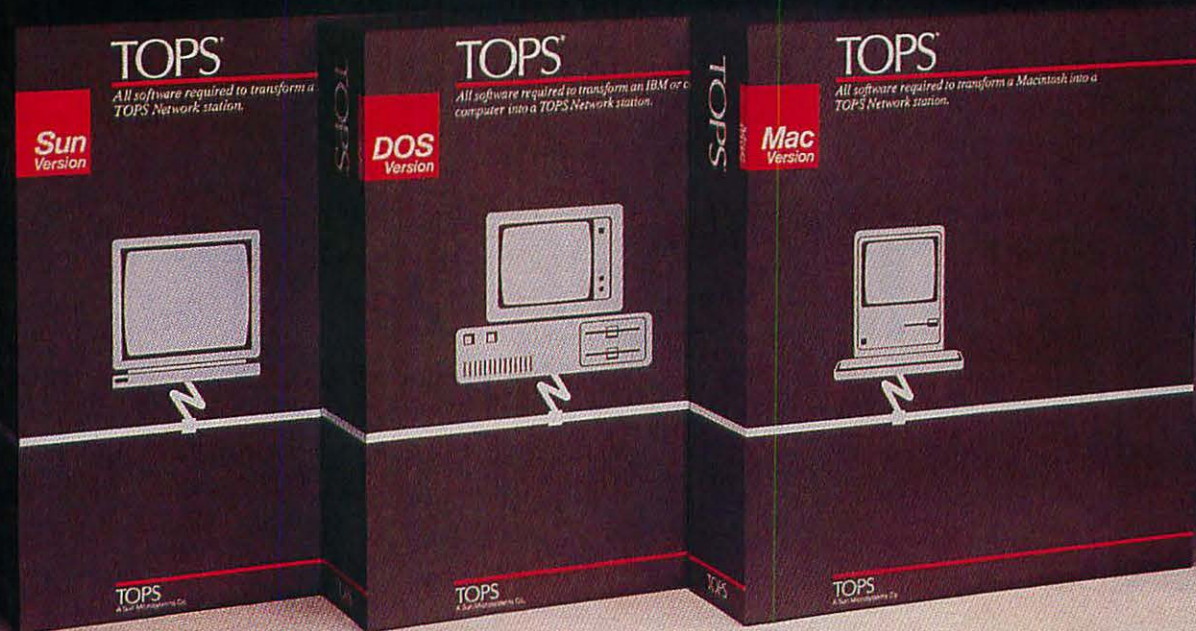
Your editorial and the accompanying article (*Commentary* and "What's Wrong with Mail Order?" December 1987) gave our company food for thought because we, too, were guilty of that core sin of mail-order houses—living on the float. As a result, "Don't process checks and credit cards un-

(continues)

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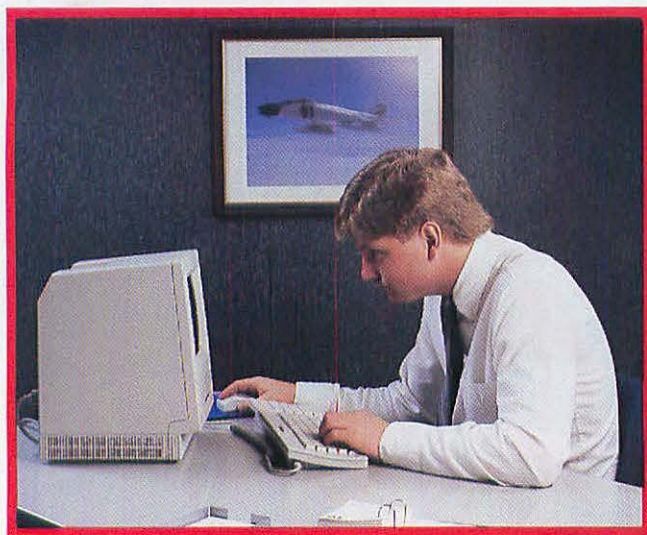
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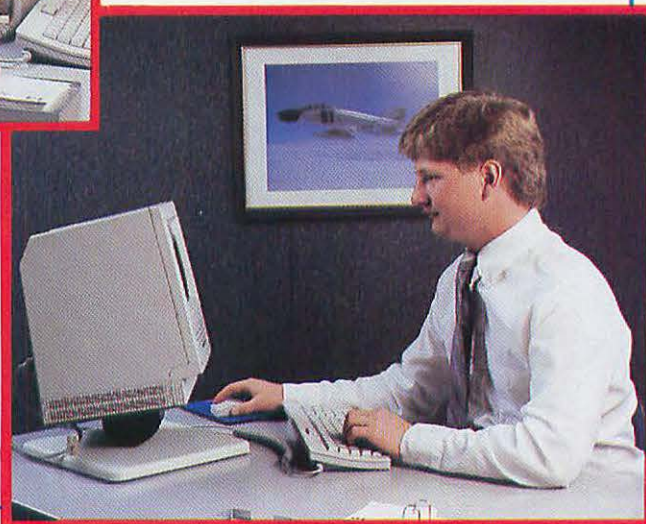
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In business environments where operators spend long hours in front of their computer, the Mac's small screen size and the low physical profile can cause physical discomfort and reduced productivity. A common solution to the low profile problem was to place the computer on top of a hard drive. This is no longer a solution for the Mac SE with its internal hard disk or the Mac Plus when used with a vertical hard drive or a file server.

Phone books, shoe boxes, and other creative ideas have been tried to bring the Mac up to eye level, but with little success.

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Letters

til everything is shipped" is now our policy. We're customizing our order-processing software to accommodate this change, but in the meantime we're manually holding up processing to coincide with shipping dates. While we do not sell Macintosh products, we thought enough of your article to recommend it to our PC customers.

*Bill Babcock
Spite Software
Portland, Oregon*

We're glad to have influenced such a responsible policy decision. At least two other mail-order firms have recently taken this route: Icon Review and PC Network (under new management as The New PC Network). Both now wait until products have been shipped before billing customers. —Ed.

Accuracy Is the Key

Your review of QuicKeys 1.0 (*Reviews*, January 1988) claims that "different sets can be easily loaded from within an application." A call to CE Software confirmed that this feature was not available in version 1.0 but would be in 1.1. Rating prerelease software is a disservice to everyone, and it makes me doubt the veracity of your reviews of other products I have not already tested myself.

*Murray Schacher
Los Angeles, California*

Our policy is to not review prerelease software. Contrary to what you were told, QuicKeys author Donald Brown confirmed that version 1.0 does allow you to open different sets of keys from within an application (see page 118 of the manual). To load a different set of QuicKeys without leaving your application, select "Read keys from the disk" under the Specials menu. Version 1.1 simply moves this feature (now called "Open set") to the Edit menu and lets you save sets without having to use the Quick Access application. —Ed.

North of the Border, Part 2

In your response to a reader's request for sources of public domain software in Canada, you directed him to Apple Canada, which is in fact the Canadian branch of Apple Computer. Although it supposedly keeps track of user groups, I wouldn't count on it.

(continues)



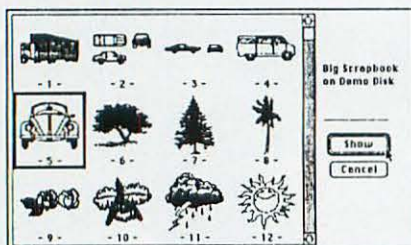
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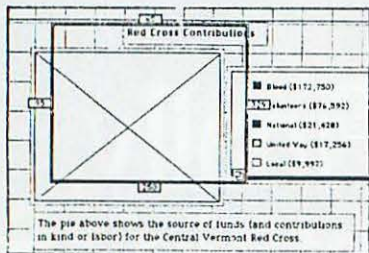
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Letters

He'd be better off joining LOGIC: the Loyal Ontario Group Interested in Computers, which has well over 200 disks of Mac public domain software available to members. At \$35 a year, membership includes a bimonthly magazine and access to our bulletin board (416/922-1626). You can join online or by sending a check or Visa number to LOGIC, P.O. Box 696, Station B, Willowdale, Ontario, Canada M2K 2P9.

Geoff Gaberty
Toronto, Ontario

Another Canadian group we've recently uncovered is Club Mac, P.O. Box 34, Station A, Toronto, Ontario, Canada M5W 1A2 (416/598-2623); and a Mac dealer in British Columbia is setting up a referral center for Canadian user groups and public domain exchange. Contact Kevin Jampole at Netex Solutions Centers, 1010 Hornby St., Vancouver, B.C., Canada V6Z 1V6, 604/681-1234.—Ed.

Science and Graphics

Are there any scientific statistical packages for the Mac that also produce graphics? I need to plot a regression line with observed points on the graph as well as 3-D surface-response graphs.

Leslie Dale
Nacogdoches, Texas

Systat, StatView 512+, and StatView II are the most widely used scientific packages, and they have all the scientific graphics anyone could want. You should also take a look at MacSpin, a special program that lets you rotate data sets in 3-D. Enabling Technologies (312/427-0386) may have released its statistics-with-graphics package by the time you read this.—Ed. □

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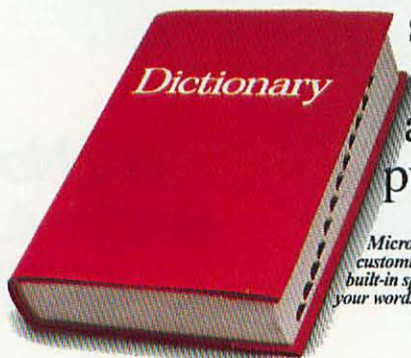
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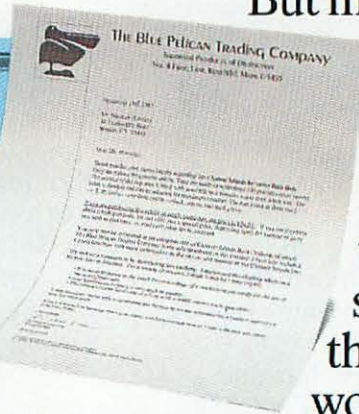
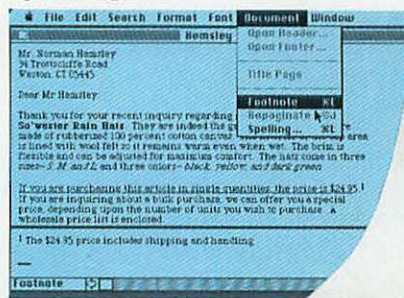
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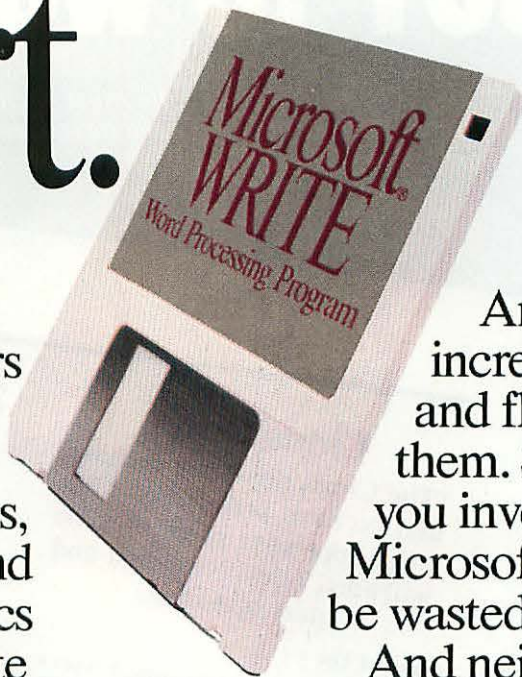
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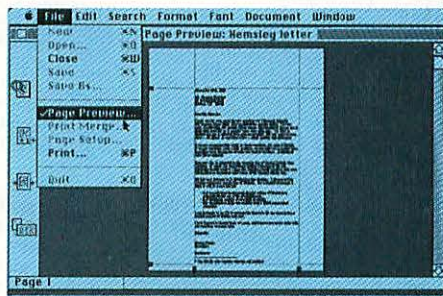
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Michael Day
The Macintosh Journal

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The Cirrus drives are exciting and excellent performers. They offer impressive speed, flexible software, attractive design and quiet operation.

Ease of Use

Running a Cirrus drive is very simple. It is just a matter of plugging the drive in and turning it on. The drives come pre-formatted and ready to go. The Cirrus has two DB 25 connectors on its case, so its cables are easier to work with than the "standard" SCSI cables that come with some drives. The design of the Cirrus drives contributes greatly to their ease of use.

The software that comes with the Cirrus drives is very flexible. It follows the Macintosh interface closely, and is well done. With the software, users can partition the drives into several volumes, or combine several drives into one single volume. Volume sizes can be changed or new ones added at any time without losing data. Password protection, manual or automatic mounting, automatic head parking, backup utilities, and disk repair utilities are all standard. In addition, the software performs several diagnostic tests including the ability to map out bad sectors and program the drive's interleave. In short, this is some of the most extensive and best written software available for Mac hard drives.

Most of the Cirrus' flexibility comes from their excellent software. However, the physical construction of the drives also contribute to their superior flexibility. Unlike other drives for the Mac, Cirrus drives can be placed vertically or stacked horizontally depending on your desktop requirements.

Performance

Cirrus drives were engineered to perform well in everyday situations. These drives are very fast when performing common operations such as going to the chooser or building the desktop. Reading and writing to and from files is also very fast. Using the Cirrus drives gave us an

appreciation of the importance of ergonomic design to performance. For instance, fan noise can increase fatigue in office workers. A drive that is built to be quiet and easy to work with may not increase the data transfer rate, but it will help to get more productivity out of the user. Cirrus drives are quiet and easy to work with which we consider to be a plus in their performance rating.

Because the Cirrus software is so good, users may want to use it to initialize drives from different manufacturers. In our tests, this worked well, and allowed drives of differing origin to be linked together as one volume. Since many of the older SCSI drives came with poor software, this is a good argument for buying a Cirrus drive and chaining it with other drives after they have been initialized with the Cirrus software.

Design and Construction

The Cirrus drives, though very small and lightweight, (about 4 lbs.), are constructed of quality materials designed to last. Their light weight is due to the small number of components in each drive and to their plastic case. The Cirrus drive is both sturdy and durable; the internal power supply is encased in aluminum, and the drives are shock mounted on rubber bearings.

The Cirrus drives have the most exciting, simple and elegant design we have seen in a hard drive for the Macintosh. The modular construction of the drives means that any repair work will be quick and easy. Simply put, Cirrus drives are a joy to work with.

Recommendations

Cirrus drives were designed for the professional user. They were not engineered to be low cost products, or to be "just adequate performers;" they are built with premium components. These are powerful drives with powerful software. Cirrus drives are an excellent solution for users who demand a lot. Readers should also note that several new products are in the pipeline and that a 40MB tape backup and 30MB hard drive are currently available. We give the Cirrus 20, 40 and 60 drives an excellent rating (8 on a scale of 10) and recommend that other drive manufacturers follow the Cirrus example, and design drives that are simple, elegant and impressive performers. -Michael Day

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Raising a Magazine

In which we ask, does the editor know best?

Magazines are like children. When you have bad ones, people you don't even know go out of their way to tell you about your problems. If you're lucky, you have good children, the kind that grow up and make a difference. But along the way you hear, "Oh, uh... nice kid." Nobody really notices all the labor and love that created the nice kid. Editors, unlike parents, have a readymade forum in which to speak, and every so often they make use of it to tell readers about their children—er, magazines. It's as inevitable as daffodils in the spring.

To begin, I should say that the dramatic growth of the Mac has us all working overtime. What a time we're having. *Macworld* now has over 250,000 circulation (that's 375,000 readers), with a goal of 275,000 by July. *Macworld* has become, over the past four years, a magazine of national stature, with responsibility commensurate with that stature. It's with a certain chagrin that I note another Mac magazine's motto: "the largest independent Macintosh magazine." That, to be candid, is horse pucky. *Macworld* has the largest circulation base of any Macintosh magazine. At least 30,000 more than our nearest competitor.

The friendly faces that you see in the nearby photo belong to our immediate family of full-time editors.

Having been the editor of 3 computer magazines and having written for 20 more over the past ten years has made me grateful to be at PCW Communications, the company that publishes *Macworld*. The most important reason? Unlike most editors in the computer press, I do not report to or take direction from a publisher. Rather, I work for the Editor-in-Chief of all PCW publications, David Bunnell. Now David may write an occasional editorial that has people calling him the Antichrist, but I be-



The largest staff of editors dedicated to covering the Macintosh.

lieve that he is driven by a deep interest in personal computers and a dedication to making his magazines the best in their fields.

When many people say *publisher*, they have a Norman Rockwell image in mind of a sagacious, sweated, pipe-smoking fellow. The old man that knows how magazines are made, how to market them, how to keep their readers. Salt of the earth. But these days most publishers are driven by the bottom line, not by ideas or idealism. Publishing is a business, not creative expression. The result is that many magazines serve advertisers first, and readers second.

One of the other Mac magazines, for example, has run two cover stories during the past 18 months extolling the virtues of products that essentially no longer exist today. But at the time of the stories, the devel-

opers had big advertising budgets. I know—I had to tell both of these companies that the critical reviews we ran of their products would stand, and that we would not be providing additional coverage. They dropped their advertising with *Macworld* and promptly ended up on the cover of another magazine, where presumably the editors had the proper take on their products.

Advertiser-driven cover stories happen a lot when an editor reports to a publisher. On the other hand, because I have a peer relationship with our publisher, we interact as such. Because of this relationship, *Macworld* ends up taking a hard stand on many things, most often with the support of our advertising staff. In the end, advertisers must recognize that any magazine that sways with the size of the advertising account is, in the long run, a disservice to both the reader and the industry.

(continues)

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What Are Our Objectives?

I could be long-winded, but quite simply our aims are objectivity, balance, timeliness, thoroughness, and in-depth coverage. What's that mean? That we are not beholden to any company or product when we decide what to write about. That we balance our coverage in each issue across subject areas, beginning with an emphasis on business applications and ranging through graphics, desktop publishing, communications, programming, utilities, and games. It means that we provide something for power users and something for beginners. We cover new products before other monthlies, and pride ourselves on having consistently done so.

So Show Me

Look at the basic organization of most magazines. They have news, features, departments, and—in computer publications—product reviews and product announcements. For example, take a couple of Mac magazines and sit down with them side by side. Leaf through them. Bear with me; it is enlightening, I guarantee. Let's start with reviews.

The bottom line: we print reviews of at least 20 products each month, more than any other magazine. More than twice as many as our nearest competitor. Not only more, but longer and in depth. Come on, I know some magazines say they run hundreds of reviews—so how many sets of Ginsu knives do you own? Read through a couple reviews. Notice that our reviews put a product into perspective? When we review something, we tell the reader about similar products and how they differ.

Notice that we don't slam-dunk a fast number rating on the top of a review. That's because we think it may mislead the prospective buyer; readers have different needs and different levels of knowledge and experience. Numeric ratings only tell you about how the product compares to some statistical ideal. Didja ever notice how few *bad* ratings are given by the people who hand out the grades? Like less than 2 or 3 percent, and none of them go to major advertisers. Coincidence? Icon or symbol ratings are the same, except they require less work and justification. Stop and think about, say, a five-symbol rating: basically you have a vague numeric equivalency. It gives the impression of having fairly evaluated a product—without the effort.

By the way, we don't print reviews of beta (prerelease) products. Our reviewers do start working with products in the beta stage, because it enables us to have more

experience with the products. We review only products that are shipping to customers.

And Furthermore

How about features? The big stories in the middle of the magazine. Compare articles on, say, disk drives. Note that our last overview of drives had over 200 products (we resisted touting how many on our cover—that's marketing hype, not substance), and no other magazine even had the specifications on 20 of the drives. It takes weeks to collate all that information. Compare a different kind of feature, one that tells how to upgrade your Mac; we've run two of those recently. One article tells what options you have, the other actually shows how to perform an upgrade (see "Installing Memory" in this issue). We run both types of articles. Other magazines ramble through desultory product descriptions; they don't compare specific features. They don't explain how accelerator cards actually differ in their architecture and how the various approaches make different cards appropriate for specific applications. The problem is that many marketing people, who tend to be influential, aren't readers. They look at table-of-contents pages and conclude that one magazine covers the same material as the other. Or they unquestioningly accept hearsay about what a magazine does.

(continues)



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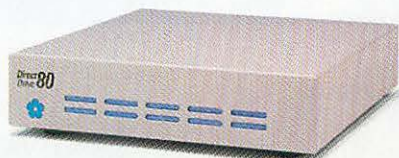
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For two years we've run technical and applications benchmarks. You'll continue to see the most accurate results in Macworld. "Independent" means we don't sell our services to developers.

We don't fill our articles with anecdotes or truisms. We do the basic research on products, try them out, and tell readers the problems they're likely to find. We dig into tough issues, such as communications, and provide answers. When we do publish hands-on articles, the author is not merely

summarizing product documentation. We tell you what product is best for which applications.

We don't do features on single products—although that's a good way to get advertising. We don't run feature after feature on games. We cover areas other magazines haven't even written about—computer-aided design, engineering, color printers.

You Got Labs, We Got Labs

Check out this photo: is this a lab or what? It's real, here in our building. We don't need to put on white coats and hype what we do. We've earned our credentials in engineering and computer science; they didn't come from the typesetting department. And we don't tell our readers that we have independent labs in-house and then tell advertisers that they can buy our lab services. Conflict of interest. We simply test products for compatibility, and the results show up throughout the magazine. The first department from our labs will run in the fall. We're the only Mac magazine to run comprehensive benchmarks on products, something we've done for nearly two years. I'm glad that others have recognized the necessity of benchmarks, but—please

—they should earn some credibility before marketing their new-found authority.

We do, by the way, offer results from an independent testing lab. National Software Testing Laboratories in Pennsylvania provides us with exhaustive applications test results. Look for our new department in August that will publish the NSTL's research on Mac applications. The truth is, no magazine publisher can afford to provide industrywide benchmarks. But ink is cheap, and some people use it that way.

What's in the Front and Back?

Departments. In the front we run columns, opinion pieces, editorials, and interviews. In the back of the magazine we have departments; we call them *How Tos*. They serve both beginning users—people who've just acquired a Mac—and those long-time users who need help getting started in a new field or tips for efficient use of their Mac tools. New users are driven to distraction by what they consider to be an assumed level of knowledge about the Macintosh. So we provide introductory

(continues)

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C.J. Weigand
MACazine Oct. 1987

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With its 68020-based color image processor, the 4693D can deliver the MAC II's 16.7 million color palette to paper or transparency. Its high-speed parallel interface can offload your MAC II in a few

seconds. And its optional 12 Mb onboard memory lets you store, queue, and print without tying up your MAC II. The 4693D-MAC II interface kit includes a high-speed parallel interface card, printer driver software, and selected high-resolution bit-map fonts, for text that's laser sharp *and* in color.

Backing the 4693D and the interface kit is Tek's 67-country service and support network. For more information about Tek's complete

4690 color printer family and OEM/VAR dealer programs, contact your local Tektronix representative. Or call 1-800-225-5434. In Oregon, call 1-235-7202.

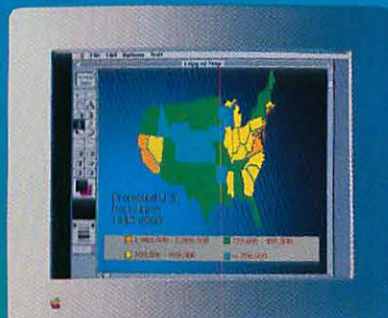


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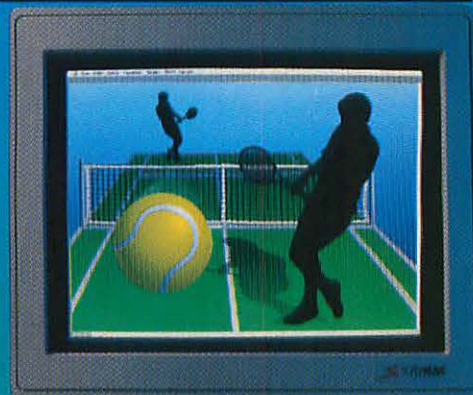
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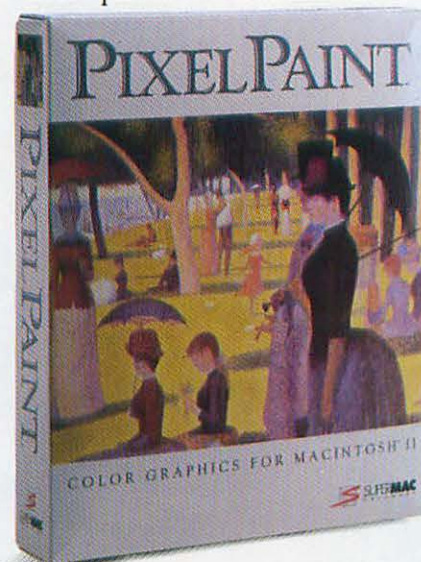
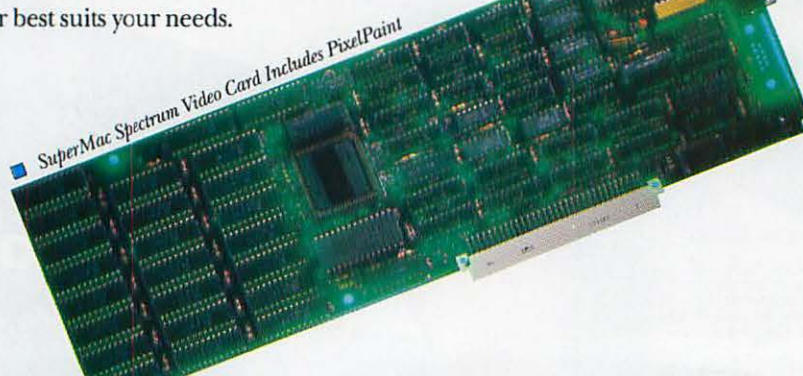
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And for a limited time, you get PixelPaint for free.

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SuperMac Standard 19" Color Monitor
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3. Get PixelPaint. (It's free with SuperMac video cards.)

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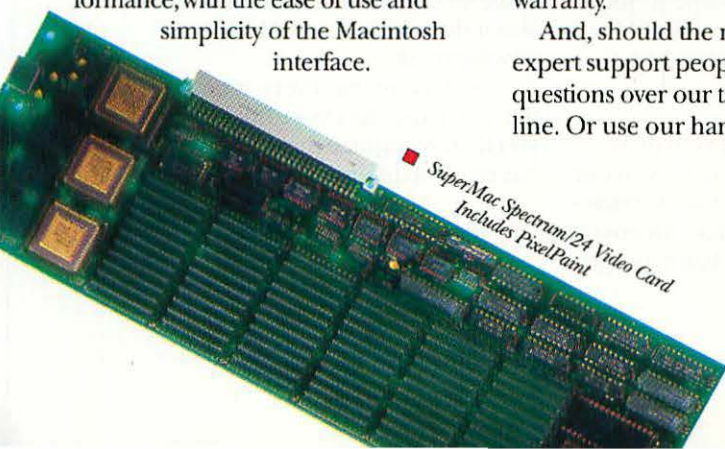


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helped shape the Mac-
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questions, and tell users how to get the
most from their products.

How Do You Do All That?

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editors helps. That's the largest staff of any
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three times the size of our nearest
competitor.

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tors. You probably recognize some of them;
as a group they've published over 20 books
on the Mac and other computers. Many
have been writing about the Mac since it
was announced. Lon Poole, Danny Good-
man, Jim Heid, Robert Eckhardt, Charles
Seiter, Rob Hahn, Erfert Nielson, Franklin
Tessler, Bruce Webster, Steven Levy—the
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the country, not chosen because of where
they work, or suddenly recognizable be-
cause they're in our pages. They've earned
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worked for it. Together they represent the
most concentrated pool of Mac experience
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Card, business, graphics, utilities, you
name it. They don't just cover the Macin-
tosh market, they've helped shape it. You
won't find them writing for any other Mac
magazine; they serve you, our readers.

New News

As the Mac has grown we've had to
shift our focus somewhat. Especially in our
news sections. With all the venues for news
in the Mac market, we know that our cover-
age has to make a difference. Again, we go

a little bit further. We don't just republish a
press release on a new product; we tell you
what it competes with, how it differs from
other products, and what, if anything, new
it brings to market. To do this we recruited
an investigative reporter, Gil Davis, with
ten years experience in newspapers. Gil
also draws upon our contributors for input.

What Have You Done for Me Lately?

What a lot of computer magazines for-
get is that our readers are also consumers.
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sumer issues such as mail order, upgrading
your Mac, how to work with user groups,
maintenance, and more. We write for you,
not for advertisers who like to see cover-
age of their products. We advocate. We
don't just receive your mail, we act on it.
If that means raising issues with Apple or
developers, all the better.

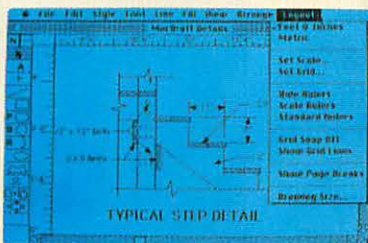
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perCard. We sponsor industry trade shows,
the Macworld Expos. We sponsor industry
events, such as the Technology and Issues
conference, in which our editors learn
about the real issues in Macintosh
development.

So forgive me. Every time I start on
the kid, I just can't stop. But one day I hope
you'll all recognize that what we've done
has made a difference. □

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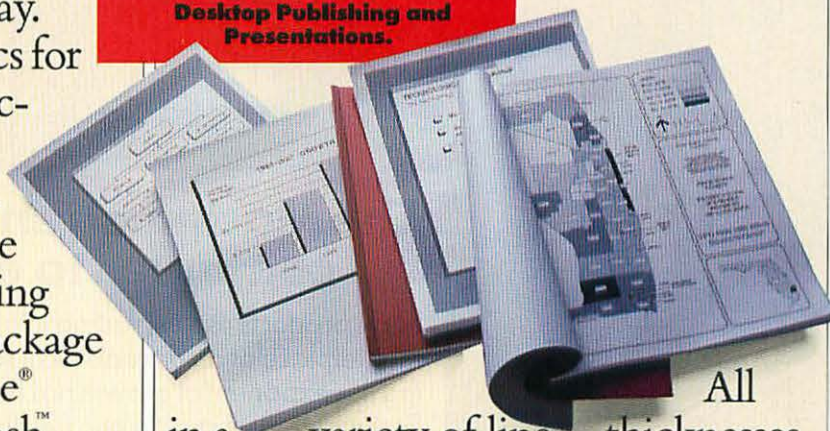
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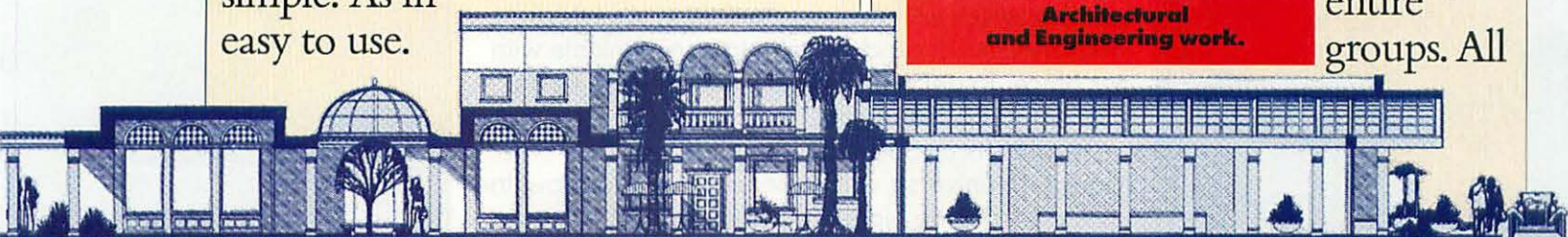


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Circle 151 on reader service card

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Circle 154 on reader service card



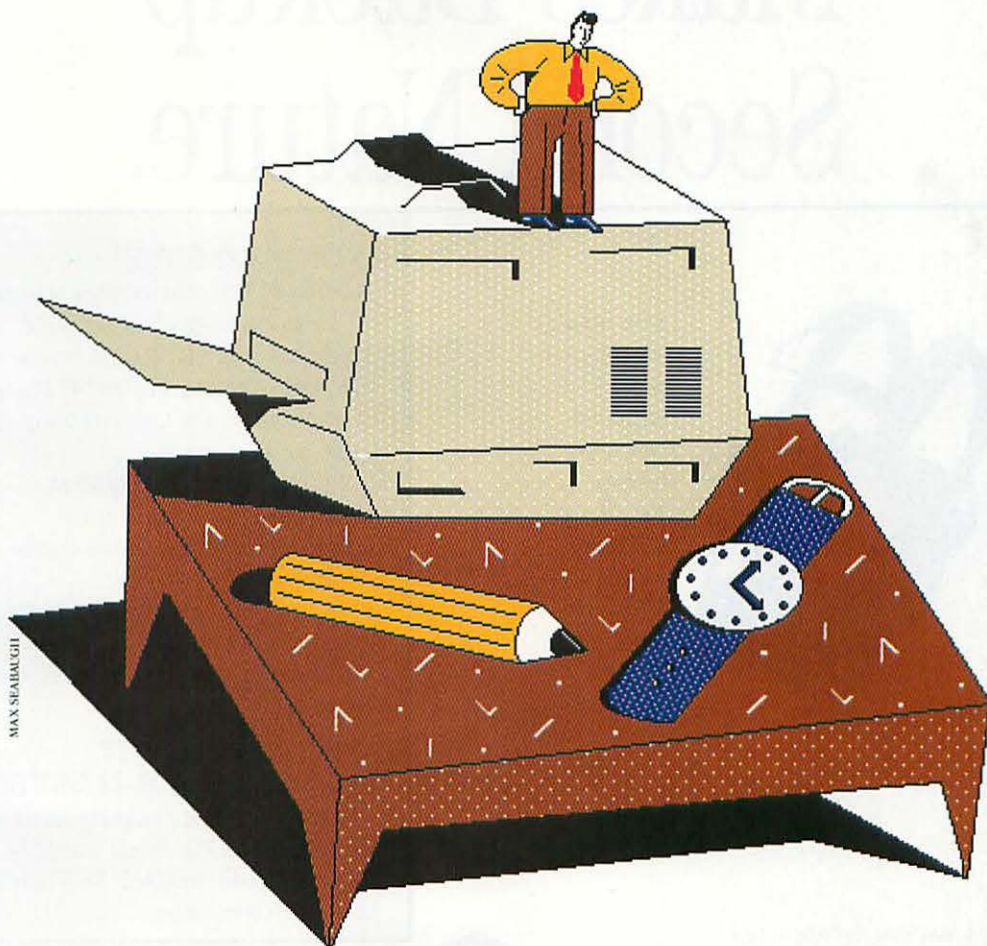
A Laser Printer of One's Own

*Is a personal laser printer worth it
—at any price?*

Yes, I have a laser printer on my desk. Even as I write these words, I can glance to my right and see it. It is big and beige. Not nearly as big as laser printers used to be, but that's part of the point. Laser printers are not what they used to be. Once, outfitting one's personal workstation with a laser printer was out of the question. Now the question is, Should I get a laser printer? And the answer is yes.

In my more contemplative moments I ask myself if I really *need* a laser printer. That query is good for 20 minutes or so of intense rumination. Certainly my life before the laser printer was not without its pleasures. Certainly I was able to produce hard copy of my work suitable enough in appearance to avoid embarrassment. Certainly I was able to find time to wait for the ImageWriter to screech out its missives, line by tedious line, tractor-feeding the output into the box I had placed on the floor. I did not think of those as dark days. I did not pace the room saying, "Oh, if I only had a laser printer things would be different."

Yet now that I have a laser printer I find that things *are* different. My copy looks perfect, carefully crafted, almost burnished. As pages escape the laser printer surreptitiously, like a rodent slipping under a closed door, I pick them up and am astonished. What editor would dare correct this obviously perfect work? The pages not only look cleaner than the *New York Times* (whose typeface they seem to share), but ink does not come off on your fingers, as it



MAX SEABAUGH

does with the *Times*. The charts I construct look as slick as the ones in *USA Today*. (Probably because that newspaper, like most in America, uses Macintoshes and laser printers.) When I print out correspondence on letterhead stationery, I envision recipients smitten with awe and respect.

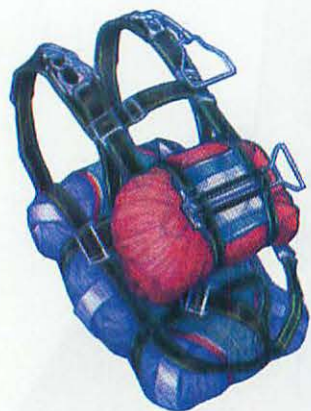
Not only does the laser printer let me print those things I did before, only faster and more clearly, but it encourages me to do things I would not try otherwise. While

it has been repeated ad nauseam that the power of the press belongs to the person who owns it, a lesser-known corollary says that the person who owns a press can't stand to have it just sit there doing nothing. Ideas for newsletters and other experiments in typographical design spring to mind. In no time, the owner of a laser printer, even one who simply wants to turn out text and spreadsheets and bar charts, finds him- or herself boning up on the basics of, say, kerning, sternly gauging software on its ability to perform that black art.

(continues)

Steven Levy is a Macworld columnist and the author of Hackers: Heroes of the Computer Revolution (Dell, 1985).

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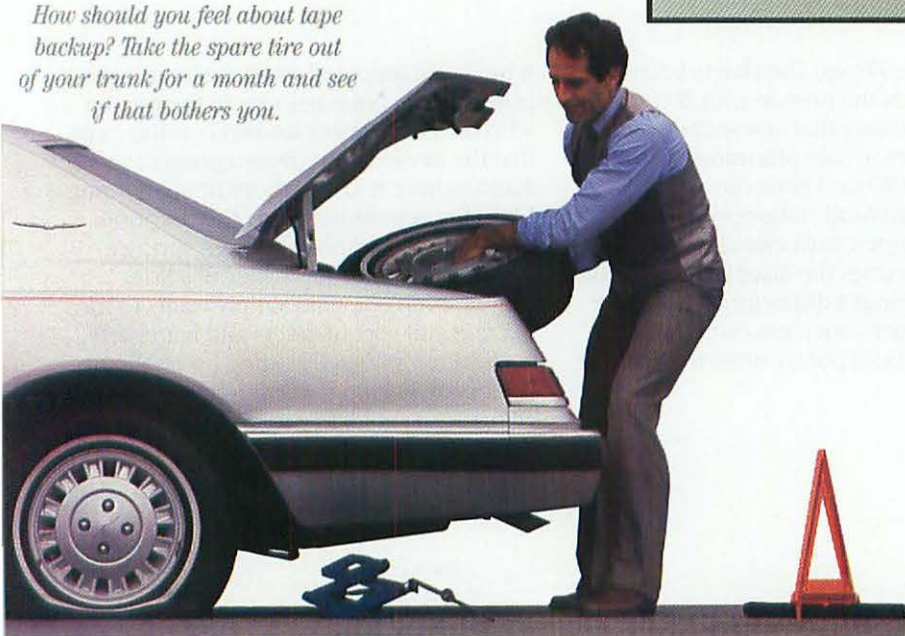
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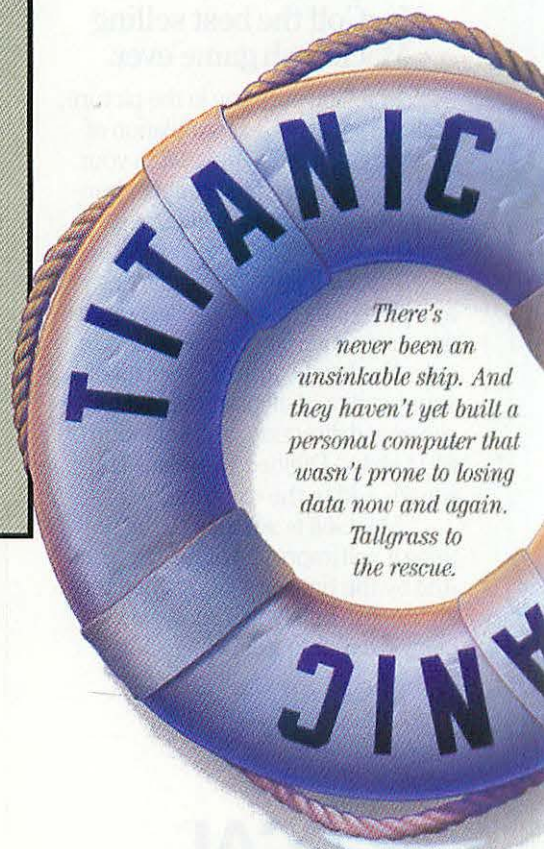
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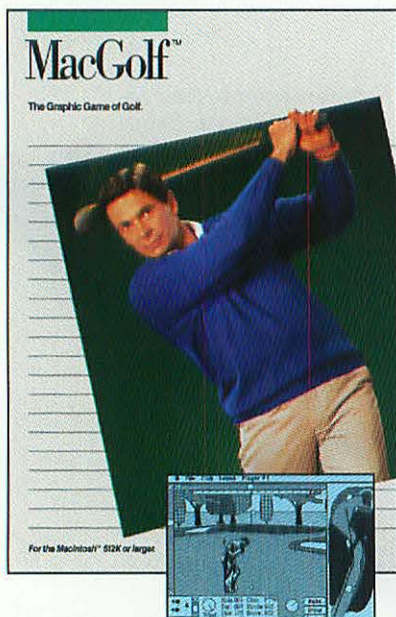


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Circle 211 on reader service card

I can go on about how wonderful laser printers are until you scream for mercy. I can explain what they can do for you, the single-computer and single-printer user. But I would not really be telling you anything you don't know. *Everybody* with a Macintosh, a graphics-based machine that was made for a laser printer, knows by now that without a laser printer you are an unfulfilled, lower-than-the-lowest, bent-up, unredeemed soda can on the grubbiest, most vermin-ridden street in an undeveloped nation. There is only one reason that all of you don't have a laser printer already. It is the same reason that I don't officially own one, instead invoking justifiable yet whiny journalistic privilege so I can borrow them from manufacturers.

Money.

You Can't Always Get What You Want

Until recently, it has not been cost-effective for the masses to buy laser printers for our Macintoshes. (Unless of course we had a specific professional application; in that case the five thousand ducats or so required for a LaserWriter would be earned back in no time.) But last year saw the introduction of what is called a QuickDraw printer, distinguished from its predecessor by what it lacked. Not only does the QuickDraw machine not have PostScript, the page-description language that is at the heart of the original Apple printer, but even more important, it does not have the memory and processor power of the PostScript machines. Instead of being a powerful computer in its own right, the QuickDraw printer leeches off the power of your Macintosh. The drawbacks of this scheme will soon be apparent; the benefits are obvious: this printer can be made much more cheaply.

So cheaply that it is now a valid option for a Mac owner who has no specific professional need for a laser printer. At the moment I write this, the laser printer on my desk, a General Computer Company Personal LaserPrinter, retails for \$2000 and is being sold in a store near me for \$1600. (For about a thousand bucks more, you can go for Apple's new QuickDraw laser printer, the LaserWriter SC, which I'll mention later.) While \$1600 isn't exactly pocket change—it'll buy you three ImageWriters—it represents a significant drop from the PostScript models, which still cannot be had for much under four or five thousand dollars.

A canny consumer might view this phenomenon suspiciously and ask exactly

what one gives up by taking advantage of such a bargain. That is what I set out to discover by personally testing GCC's laser printer, the PLP. Several months before, for purposes of future comparison, I had procured the loan of a fire-breathing, \$5000 QMS 800+ Laser Printer, and had been delighted at every turn, finding fault only with its unwieldy bulk. In short, I spoiled myself.

This was a mistake that ruined the thrill of operating with the GCC machine, because instead of delighting in its considerable benefits, I found myself grumbling at its drawbacks. As a former PostScript machine jockey, my high point with the PLP came in the first few minutes when I discovered that I could actually lift the printer out of the box and onto my desk without risking a hernia. Since it virtually required a derrick (actually a guy I knew named Buddy) to get the QMS behemoth a few feet off the ground, I was favorably disposed toward the Personal LaserPrinter.

Installation was not a problem, as one does not need to purchase a \$50 AppleTalk connector. I did, however, have to clear off some space on my hard disk to make room for a couple of disks' worth of fonts. (Incidentally, without a hard disk, I would not try the PLP.)

There were two setup problems. One is the PLP's toner cartridge. Unlike the stuff contained in QMS and LaserWriter cartridges, the toner substance in the PLP—a coal-black dust that I imagine causes horrible diseases if breathed in—is not sealed off. In fact, when you move the computer, you're supposed to keep it level so that this guck doesn't spill all over. I'm sure that in a perfect world where directions are followed carefully, none of this toner would find its way to the floor or the cuffs of a new blue shirt. But since human beings are in charge of replacing cartridges and unjamming paper from printer innards, I would have to say the world falls short of perfection. In other words, I assure you that if you use the Personal LaserPrinter for any length of time, part of your body or clothing is at some point going to look like Al Jolson. Be forewarned.

The other problem is limited to a hapless group of people Apple Computer has gyped, and won't admit it. These are the early Mac Plus owners, those who received the notorious "A" ROMs that work fine ex-

(continues)

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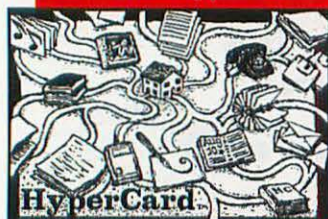
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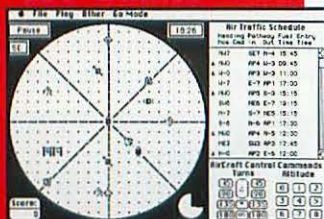


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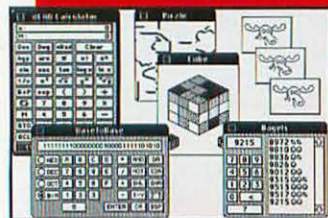
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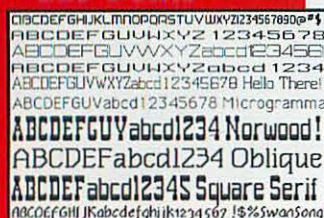
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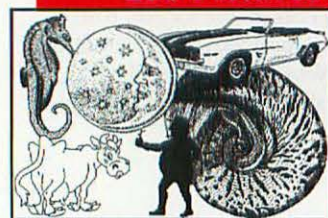
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Circle 71 on reader service card

Steven Levy

cept when SCSI peripherals are attached to the computer. In that case, unless the peripheral is turned on, the computer doesn't work at all. Apple fixed the problem when manufacturing new computers, but won't do anything for people stuck with the old one. People like me. This had not been such a terrible glitch—until I got the PLP. Because if the printer cable is connected to my system, I cannot use the Mac unless the printer is turned on. But it makes no sense to turn on the printer unless you're using it. Otherwise you have to cope with the noise of its fan—which sounds like a Greyhound bus warming up...in a garage. This emphasizes what readers of this column already know—unless you absolutely need it, don't buy a computer until it has been shipping for at least six months, and that includes Apple computers.

The Quick and the Dead

It was not until I actually *used* the Personal LaserPrinter that I fully appreciated its drawbacks. It is slow. Now the word *slow* is a comparative term. When I say this printer is slow, am I comparing it to a typist? To an antique daisy wheel printer? To an ImageWriter? No. I am comparing it to the PostScript printer that recently left my life. The comparison is unfair because the PLP costs less than half the price of the LaserWriter or the QMS 800+. This is what I kept telling myself as the Personal LaserPrinter tackled a Microsoft Word file. Believe me, I had plenty of time to tell myself things. Because I had done something very stupid. I had promised my Closest Friend that I would be able to churn out the manuscript for her book in a few hours, for delivery to her publisher. How slow, I figured, could the GCC printer be?

Let's just say that "a few hours" became measurable in days. Because while the QMS could spit out six pages a minute of Word copy no sweat, the PLP strained to do one page a minute. And this manuscript was around 750 pages.

It was not until I actually spoke to the GCC folks that I was convinced that my machine was not faulty—it was supposed to take that long. This is because the page composition takes place in my Mac Plus. If I had a Mac II, or a 68020 coprocessor in an SE, the process would have been shortened by perhaps 20 percent. On the other hand, if I had only a mere megabyte of memory in my Mac, and not the mighty 2½ megs I had recently installed, things would have taken even longer.

Just as I was getting this to press, GCC helped things along by releasing a new ver-

sion of its software that increased the PLP's speed somewhat and, more important, improved the quality of its draft mode, which does zip along at six pages a minute or so. Before this release, draft quality had looked like ImageWriter output produced with a worn ribbon. Now it's acceptable, depending on the font (New York is fine; Times looks terrible). Still, if getting pages of text out fast is important to you, you'd be better off spending a few hundred dollars more for Apple's QuickDraw LaserWriter SC, which uses a different technical approach that yields a faster text output rate.

Yet Another Car and Computer Analogy

The good news is that the finished PLP copy looked every bit as good as it did with the more expensive printer. I mean, it looked *great*. The letters were just as sharp as the higher-priced spread and the blacks looked even denser.

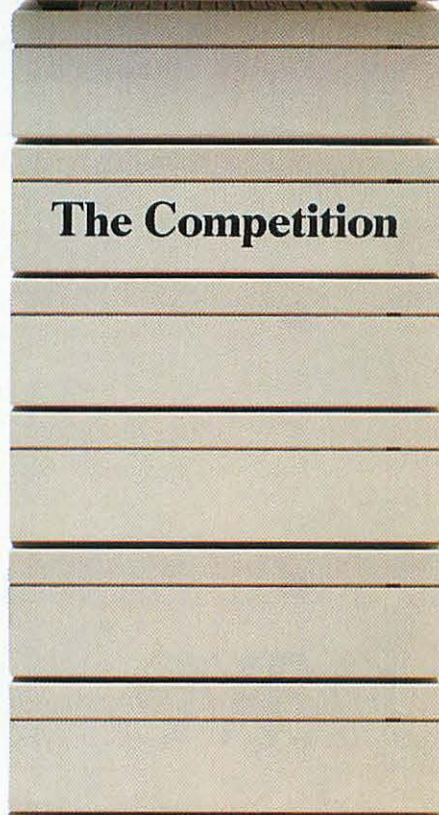
Let me dust off the computer writer's best friend, the auto analogy. Ah-hem. Using the PLP instead of a PostScript machine is like driving a used Toyota Tercel instead of a BMW. It is less comfortable and slower during the drive. But it gets you there. And, miraculously enough, as soon as you pull into the driveway, your beat-up Tercel transforms itself into a BMW! As far as the parking valet is concerned, you are a millionaire.

But, oy, when you're driving...you know it's a Tercel. Partly because the PLP runs by some strange rules, it has compatibility problems with some of the Macintosh world. GCC has been forthright about this, including a list of programs that work well with the printer only after certain adjustments are made in your working habits or your output. (One obvious problem is its nonsupport of PostScript; special effects in that language will not be printed.) But strange things sometimes crop up.

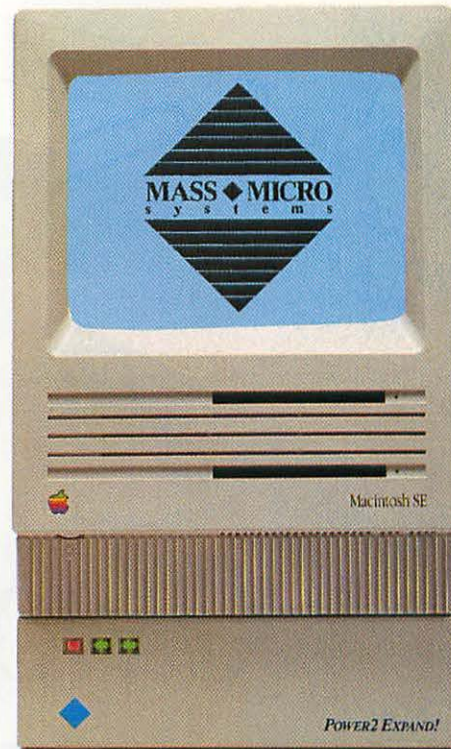
For instance, the PLP uses a mode of centering things on the page that is different from other printers. This sometimes makes margins wind up differently on the page from what you might expect. And page numbers, depending on the program, might not show up at all. For Microsoft Word 3.01, I had to make a special adjustment, positioning them 1½ inches from the margin—so they can appear on the page ½ inch from the margin. Of course, if someone else uses my Word files, that per-

(continues)

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The Competition

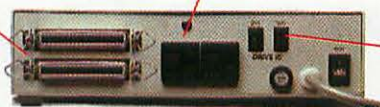


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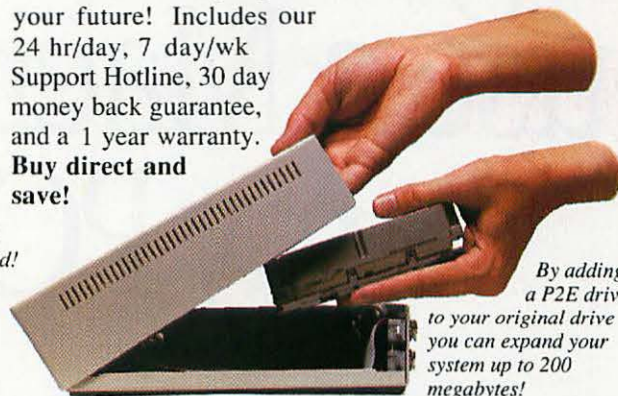
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"You can't have your Macintosh™ and PC too." Famous last words.

People say, "Where there's a will, there's a way." Which means I don't settle for words like No. Impossible. Can't be done. No way.

So when I decided I wanted a Macintosh, but didn't want to give up Lotus 1-2-3® or dBASE® III, I naturally set about looking for a way to have it all.

The fastest fix was to buy both an IBM® PC and a Macintosh. "Not possible," said the DP/MIS manager. "Pick one. Any one you want, as long as it's MS-DOS® compatible." Witty guy.

Then I searched everywhere for someone willing to loan me a PC in exchange for executive privileges. I was willing to give up anything, but I kept hearing No. Not interested.

Without another alternative in sight, I decided to surrender and settle for a PC. Then, I discovered an article on AST's newest products—

What I like best about AST's Mac86 and Mac286:

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MS-DOS co-processors for the Macintosh II and Macintosh SE. The cavalry had arrived.

The article said AST's Mac86™ and Mac286™ allow you to actually run MS-DOS application programs on your Macintosh. Just plug the DOS

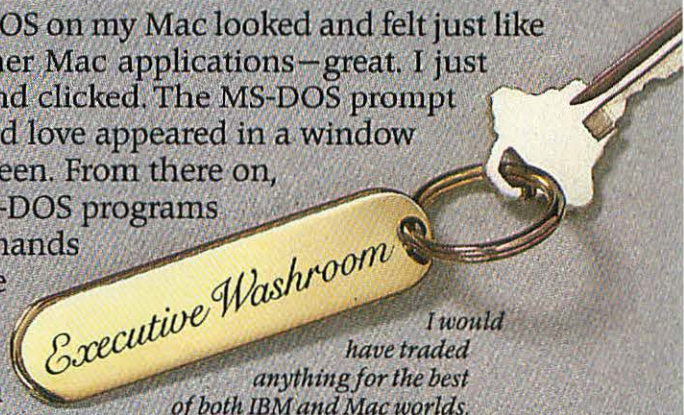
processor into your Macintosh II—Mac86 into an SE—and load your favorite MS-DOS application software onto the Mac's hard disk. I was sold.

MS-DOS on my Mac looked and felt just like all my other Mac applications—great. I just pointed and clicked. The MS-DOS prompt I know and love appeared in a window on my screen. From there on, I used MS-DOS programs and commands as if I were working on a PC.

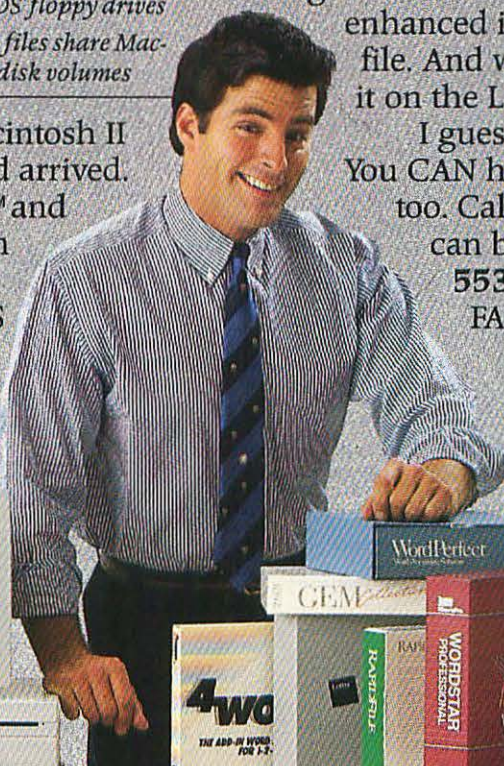
I even moved Macintosh files into MS-DOS, sometimes cutting and pasting parts from one environment to the other. And when I was finished with my PC and Macintosh files, I stored them both on the same Macintosh hard disk without any clumsy file transfer procedures to slow me down.

Back in the Macintosh environment, I still had immediate access to all of my PC files. Using Macintosh software, I reopened a PC file, enhanced it, then merged it with a Mac file. And when I was finished, I printed it on the LaserWriter®.

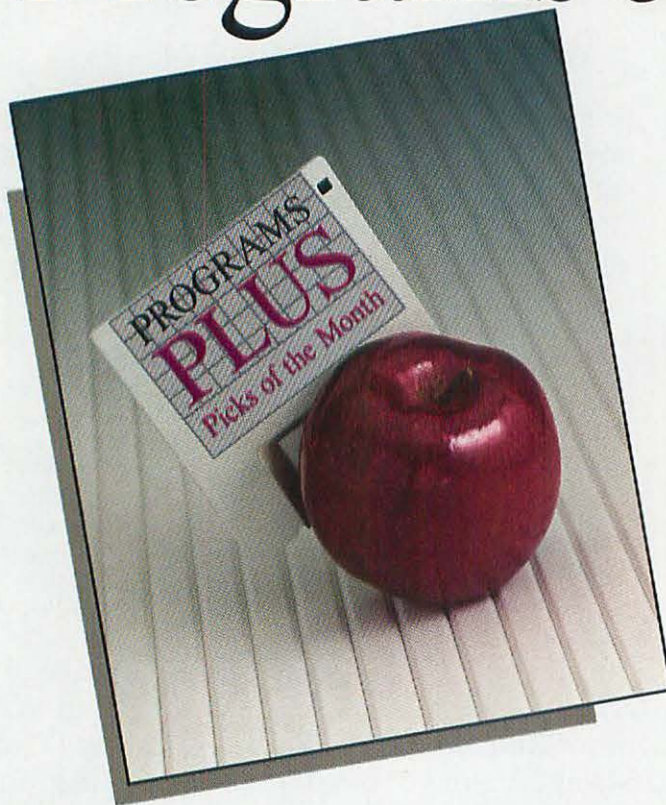
I guess the moral of this story is: You CAN have your Macintosh and PC too. Call AST today to find where you can buy Mac86 or Mac286. (714) 553-0340. BBS: (714) 660-9175. FAX: (714) 660-8063.



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Programs & Peripherals



Microphone II by Software Ventures



Microphone II is one of the most sophisticated, while easy to use communications programs available for any computer. The unique design of this program makes it an extremely powerful tool for the experienced user, and a saviour for the novice. Pre-programmed icons make it simple to access major information services such as Compuserve or Dow Jones, with automatic log-in and sign-on. You can record your entire session through the "Watch Me" feature, and replay it later through a single keystroke. The new version of **Microphone II** is now Multifinder compatible, and comes with a free copy of Glue, a graphics/text transfer utility.

Microphone 1.1 209.

Utility Software

Apple Computer Switcher Const. Kit	14.	Read-It! TS (For Thunderscan)	79.
ALSoft Disk Express 1.10	26.	Read-It! O.C.R. (For Image Scanners)	199.
Font/DA Juggler Plus	Call	Software Power Power-up Disk Optimizer	33.
Berkeley System Design Stepping Out II	55.	Software Supply	
Beyond Inc. Menu Fonts 2	32.	Suitcase or Power Station	38.
CE Software QuickKeys (Macro Program)	57.	SRT MacTree	39.
DiskTop 3.0 or CalendarMaker 3.0	29.	SuperMac Software SuperSpool	42.
Central Point Software Copy II Mac (Includes MacTools)	Special 20.	SuperLaserSpool	82.
Electronic Arts Disk Tools Plus	31.	Multi-User SuperLaserSpool	199.
Fifth Generation Systems		Diskfit 1.4	54.
FastBack For The Macintosh	59.	Network Diskfit 1.3	203.
Ideaform Disk Quick V2.10	25.	Sentinel	155.
HyperBook Maker	30.	Synex Mac Envelope	15.
Infosphere MacServe (Network Software)	158.	Mac Invoice	25.
LaserServe (LaserWriter Print Spooler)	63.	TOPS Tops For The Macintosh 2.0 or Net Print	119.
Olduvai Software ADBridge	67.	Williams & Macias	
DA-Switcher II	25.	myDiskLabeler w/Color	31.
Font Share	149.	myDiskLabeler w/LaserWriter Option	34.
Icon-It! (Assign Icons to Menu Items)	39.	Working Software, Inc. Findswell	29.

Rags to Riches 3 Pak GL/AR/AP Version III by Chang Laboratories



Rags to Riches Version III provides users more "Choices" in their accounting selection, setup, operation and reporting! Each module has more options to let you customize the operation to the way YOU do business. It gives you more flexibility to format reports, invoices and statements to suit your personality. This is the fastest accounting package available for the Macintosh. Success in accounting can be yours with **Rags to Riches Version III**.

Rags to Riches 3 Pak (GL/AR/AP) Version III 279.

Laser Fx by Postcraft International Inc.

Since the advent of the desktop publishing industry, no product has proven to be as useful, or as easy to use as **Laser Fx** from Postcraft. Simply take any PostScript font and use any of the 30 special effects to create a dazzling typographical masterpiece. You can print directly from Laser Fx or paste into Quark XPress, Ready, Set, Go!, Microsoft Word, or most other popular desktop programs. It can also be used to create special effects in newsletters, designing logos, or adding that extra pizzazz to your presentation. **Laser Fx** also has the ability to read PICT or paint files created in other programs such as MacDraw or MacPaint. Bring your desktop software and laser printer into the next generation with **Laser Fx**.



Laser Fx 117.

Desk Accessory Programs

Affinity Microsystems Tempo II	94.	Imagine Software	
AffiniFile	46.	Smart Alarms & Appointment Diary	35.
Borland SideKick V2.0	59.	Multi-User Appointment Diary with Smart Alarms	89.
Cortland		Solutions, International	
Top Desk	32.	SmartSerap & The Clipper	36.
Greene, Inc.		Symmetry HyperDA (Req. 512K)	38.
QuickDex 1.4	39.		

Languages

Apple Computer MacPascal	99.	Microsoft	
Borland Turbo Pascal	65.	Microsoft Basic Interpreter 3.0	65.
Turbo Pascal Numerical Methods	63.	Microsoft Basic Compiler 1.0	127.
Turbo Pascal Tutor	43.	Microsoft Fortran Compiler 2.2	180.
Consulair		THINK Technologies Lightspeed C	109.
Macintosh 68000 Development System	59.	Lightspeed Pascal	65.
Mainstay		CAPP's for Lightspeed C or	
V.I.P. (Visual Interactive Programming)	85.	CAPP's for Lightspeed Pascal	49.

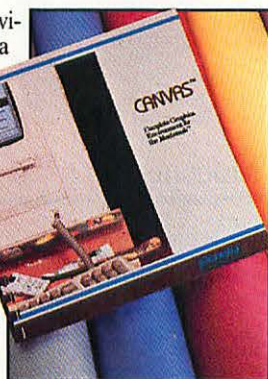
Communications Software

Apple Computer MacTerminal	99.	Software Ventures	
Compuserve Compuserve Starter Kit	24.	Microphone II (Includes Glue)	Special 209.
DataViz MacLink Plus with Cable	145.	Think Technologies, Inc.	
Freemsoft Red Ryder V10	49.	InBox-Start Kit V2.0	
Palantir InTalk V3	99.	(3 Personal Connections)	209.

to Polish Up Your Mac...

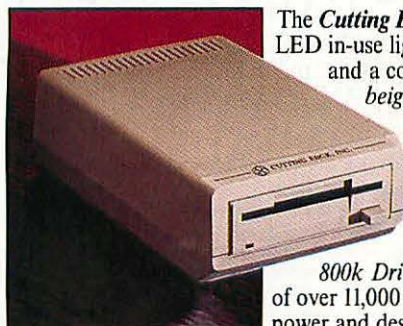
Canvas by Deneba Software

Canvas is truly the complete graphics environment for the Macintosh. If you need a draw program, a paint program, text editing, high resolution images, embedded PostScript or more, then *Canvas* is for you. You can rotate objects, create multiple duplicates of an object or group of objects, or view and edit drawings and text at any magnification or reduction from 3.125% to 3,200% of the original. You can also use the desk accessory version of *Canvas* (included) to edit your graphics without leaving your favorite desktop program, database, spreadsheet or word processor.



Canvas 109.

Cutting Edge 800k Drive by Cutting Edge, Inc.

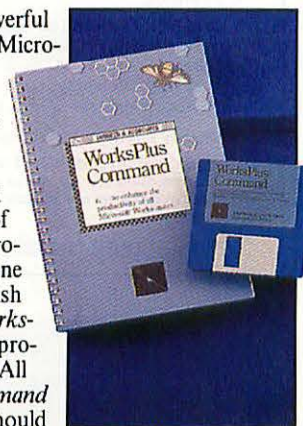


The *Cutting Edge 800k Drive* features an LED in-use light, a manual eject button, and a compact case (available in beige or platinum) that matches Mac aesthetics. It's compatible with old and new Mac ROMs so you can use it on a standard Mac 512k, a MacPlus, or a Mac SE. The *Cutting Edge 800k Drive* also has a MTBF rating of over 11,000 hours, and offers advanced power and design at an economical price.

Cutting Edge 800k External Drive 175.

WorksPlus Command by Lundeen & Associates

WorksPlus Command is the most powerful macro package available for use with Microsoft Works. You can record an unlimited number of keystrokes, open and close documents, even move information between Works modules, and execute them with a single keystroke. You can print multi-column labels and reports, automatically generate table of contents and indexes for your word processing documents, even dial your phone from your database. For those who wish to write your own unique macros, *WorksPlus Command* includes a full macro programming language similar to Pascal. All this and more makes *WorksPlus Command* a program no Microsoft Works user should be without.



WorksPlus Command 60.

MacSnap Internal Memory Expansions by Dove Computer Corporation

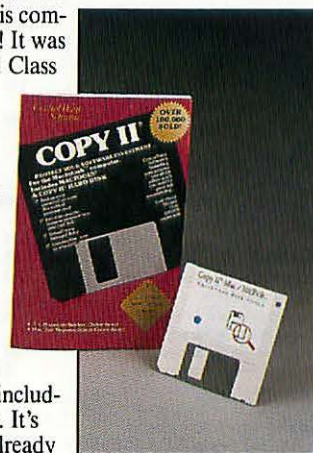


It's a safe bet that no matter what Macintosh model you have, Dove Computer has a *MacSnap* memory expansion product that matches your needs. That's because Dove has an extensive line of high quality memory and productivity enhancement products available. All Dove products are easy to install and represent a superior value! We've selected some of the most popular models, and are offering them at special prices. All models listed include Dove's *RamSnap* software, their intelligent ram management software.

MacSnap 2SE	289.
MacSnap 524E	120.
MacSnap 524S	215.
MacSnap 548E	359.
MacSnap 548S	435.
MacSnap Plus 2	249.

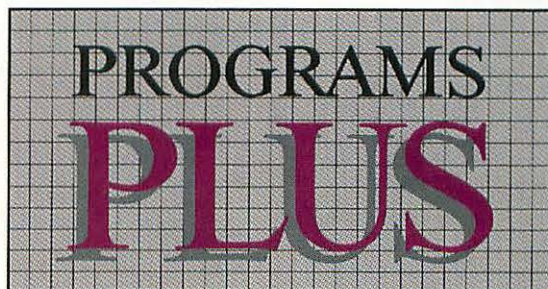
Copy II Mac by Central Point Software

Copy II Mac has always been the standard by which all other backup software is compared to, and it keeps getting better! It was awarded the 1987 MacWorld-World Class Award, MacUser Editors Choice Award, A+ Readers Choice Award, just to name a few. *Copy II Mac* is really seven applications in one, including the ability to make backups of "copy protected" software (for archival purposes only), and *Copy II Hard Disk*, which lets you run some protected software directly from your hard disk, RAM disk, etc. Also included is *MacTools*, which is a general disk and file utility with a variety of useful options, including a hard disk undelete files option. It's plain to see why *Copy II Mac* has already sold over 100,000 copies.



Copy II Mac 20.

Positively A Plus



800/832-3201

Positively A Plus!

Game Software

Access World Class Leader Board Golf	24.	Business Card Maker	36.
Accolade Hard Ball	23.	Microsoft Flight Simulator 1.02	32.
Activision Firepower	16.	Miles Computing Inc.	
Shanghai or Romantic Encounters	24.	Downhill Racer or Quintette	24.
Tass Times in Tontown	21.	Harrier Strike Mission II	
Might and Magic	37.	or The Fool's Errand	27.
Artworx Bridge 5.0	22.	Fool's Errand Hint Booklet	7.
Avalon Hill Mac Pro Football	29.	Mindcape Balance of Power,	
Baudville Award Maker Plus	27.	Crossword Magic or Citadel	30.
Broderbund Ancient Art of War	27.	Deja Vu: A Nightmare Comes True	30.
Bullseye Software		King Of Chicago, Shadowgate or	
Fokker TriPlane or Ferrari Grand Prix	33.	Trust and Betrayal	30.
Electronic Arts Ogre	32.	Defender of the Crown, Siboot	
Reach for the Stars	37.	or The Uninvited	30.
Starfleet I	47.	Practical Computer Applications	
Venture's Business Simulator	28.	MacGolf 2.0 or MacRacquetball V2.0	35.
ChessMaster 2000, Patton vs Rommel		MacCourses	31.
or Scrabble	28.	Psiom Psiom Chess (3D & Multi-Lingual)	34.
Archon, One-On-One, Pinball Construction		Sierra On-Line Space Quest	30.
Set, Seven Cities of Gold, Software		King's Quest I, II, or III (each)	30.
Golden Oldies or SkyFox (each)	15.	Leisure Suit Larry	24.
EPYX Winter Games		Police Quest	35.
or Sub Battle Simulator	24.	Silicon Beach Software	
Hayden Software Sargon III	29.	Enchanted Scepters	21.
Infinity Software, LTD. Go	25.	Dark Castle or Apache Strike	27.
Infocom Bureaucracy, Leather Goddesses		World Builder	41.
of Phobos, Nord & Bert, Plundered		Simon & Schuster	
Hearts, Sherlock, or Stationfall (each)	24.	Star Trek (The Kobayashi Adventure)	24.
Beyond Zork	32.	Sir-Tech Mac Wizardry	35.
Hitchhiker's Guide to The Galaxy	18.	Spectrum Holobyte Solitaire Royale	19.
Science Fiction Classics	35.	Sphere, Inc. GATO, Orbiter, or Falcon	26.
Zork Trilogy	44.	XOR Software NFL Challenge	65.
Intracorp Bumper Sticker Maker	35.	Pro Challenge	31.

Laser Printers & Digitizers

AST Research TurboLaser P/S	3559.	New Image Technology Magic Digitizer	
TurboScan	1199.	(Mac 128/512k or MacPlus Version)	249.
Impulse		Summagraphics MacTablet 12x12 size	379.
Impulse (MacNifty) Audio		ThunderWare ThunderScan V4.0 with	
Digitizer V2.0 w/Soundwave	149.	Power Port (Mac 512K, 512K Enhanced,	
Koala Technologies Corp.		MacPlus, and Macintosh SE)	199.
MacVision (Digitizer)	169.	Mac II Power Accessory	42.

Accessories

Abaton ProPoint (ADB TurboMouse for Mac SE & Mac II)	119.	Apple Security Kit	34.
Bech-Tech Fanny Mac (Beige or Platinum)	65.	Polarizing Filter	33.
Cambridge Automation Numeric Turbo	99.	Printer Muffler 80	38.
Central Products		Printer Muffler 132	51.
MacOpener (All In One Mac Tool)	16.	Control Center	63.
Curtis Manufacturing		System Saver Mac (Beige or Platinum)	64.
Diamond-Surge Suppressor-SP-1	29.	Super Base	Call
Emerald-Surge Suppressor-SP-2	36.	System Saver SE	Call
Ruby-Surge Suppressor-SPF-2	55.	Masterpiece Mac II	Call
Sapphire-Surge Suppressor-SPF-1	47.	A/B Box (MacPlus Only)	63.
Cutting Edge Cutting Edge		Turbo Mouse (Reg. or ADB)	82.
EADB-105 (Mac SE & Mac II)	139.	Lightgate Felix (Second Generation	
DataDesk MAC-101 Keyboard/Beige		Pointing Device)	99.
(128k/512k & MacPlus)	139.	Mouse Systems A+ Mouse (MacPlus)	69.
MAC-101 ADB Keyboard/Platinum		A+ ADB Mouse (Mac SE/Mac II)	89.
(Mac SE & Mac II)	139.	Moustrak MousePad 7" x 9" Size	8.
Ergotron		MousePad 9" x 11" Size	9.
MacTilt or MacTilt SE (Platinum Color)	69.	Moustrak L/F (Low Friction)	9.
Mouse Cleaner 360°	15.	Nuvotech	
I/O Design		EasyNet (Specify Din 8 or DB-9)	27.
Mac Luggage Available in Navy		Orange Micro Grappler C/Mac/GS	
or Platinum Gray		(Parallel Interface for the Mac)	77.
Macinware Plus Carrying Case	64.	Grappler L/Q (Parallel Interface	
Macinware SE Carrying Case	74.	for 24 Pin & Laser Printers)	99.
Macinware II Carrying Case	44.	Orchid Technology ColorVue SE	505.
Kalmar Designs		Ribbons Unlimited	
Teakwood Roll-Top Disk Cases:		Available in Black, Blue, Brown, Green,	
Micro Cabinet (holds 45 disks)	14.	Orange, Purple, Red, Yellow, Silver & Gold	450.
Double Micro Cabinet (holds 90 disks)	20.	ImageWriter Ribbon-Black	5.
Triple Micro Cabinet (holds 135 disks)	28.	ImageWriter Ribbon-Color	25.
Kensington External Disk Drive Cover	8.	ImageWriter II-Four Color Ribbon	11.
Extra Long ADB Keyboard Cable	25.	Silicon Comforts MacChimney	
Macintosh II Stand	33.	(Very Effective Cardboard	
Macintosh II Monitor Cable Extension		Laminate Convection Cooling Device)	16.
Mouse Pocket (Reg. or ADB)	8.	SoftStyle MacEnhancer	165.
Mouseway (Mousepad)	8.	The Madson Line	
ImageWriter or ImageWriter II Cover	9.	Professional Series Carry	
Macintosh Plus/SE Dust Cover	17.	Cases In Black Ballistic Nylon	
Mouse Cleaning Kit w/Pocket	20.	Mac(Plus) Carry Case	79.
Disk Drive Cleaning Kit	22.	Mac SE Carry Case	99.
Tilt/Swivel	22.	ImageWriter I (II) Carry Case	75.
Universal Copy Stand	23.	TOPS Tops Tele-Connector DB-9	39.

Blank Media

Single Sided 3 1/2" Diskettes		Double Sided 3 1/2" Diskettes	
BASF 3 1/2" SS/DD Disks (box of 5)	8.	BASF 3 1/2" DS/DD Disks (box of 5)	9.
Bulk (Sony) 3 1/2" SS/DD Disks (10)	12.	Bulk (Sony) 3 1/2" DS/DD (10)	16.
Sony 3 1/2" SS/DD Disks (box of 10)	12.	Centech 3 1/2" DS/DD Color Disks (10)	19.
Centech 3 1/2" SS/DD Color Disks (10)	16.	Sony 3 1/2" DS/DD Disks (box of 10)	18.
Fuji 3 1/2" SS/DD Disks (box of 10)	13.	Fuji 3 1/2" DS/DD Disks (box of 10)	19.
Maxell 3 1/2" SS/DD Disks (box of 10)	13.	Maxell 3 1/2" DS/DD Disks (box of 10)	20.
Verbatim 3 1/2" SS/DD Disks (box of 10)	13.	Verbatim 3 1/2" DS/DD Disks (box of 10)	20.
3M 3 1/2" SS/DD Disks (box of 10)	14.	3M 3 1/2" DS/DD Disks (box of 10)	20.
C.Itoh Color Disks SS/DD (box of 10)	22.	C.Itoh Color Disks DS/DD (box of 10)	25.

Modems

Everex		Promodem 2400 (Hayes Compatible)	309.
Emac 2400 Baud	225.	Mac Paek w/Procom M and Cable	
Hayes Microcomputing		(Specify Mac or MacPlus)	49.
Smartmodem 1200	299.	Shiva Net Modem V1200	369.
Smartmodem 1200 Mac		Net Modem V2400	489.
w/Smartcom II & Cable (MacPlus)	359.	Net Modem X232	309.
Smartmodem 2400	449.	Net Bridge	309.
Migent		Supra Corporation	
Migent Pocket Modem		Supra Modem 2400	154.
(ext. 300/1200 Baud)	115.	U.S. Robotics	
Novation		Courier 1200 (Hayes Compatible)	199.
Novation Parrot 1200	93.	Courier 2400 (Hayes Compatible)	349.
Prometheus		Courier 2400E (Hayes Compatible)	379.
Promodem 1200 (Hayes Compatible)	239.	Courier HST 9600 (Hayes Compatible)	689.

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Customer Service (203) 378-3662
Monday thru Friday 9 A.M. to 9 P.M.
Saturdays 10 A.M. to 6 P.M. (Eastern Time)

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- We accept MASTERCARD and VISA with no added surcharge.
- Your credit card is not charged until we ship.
- If we must ship a partial order the shipment that completes the order is sent freight free.
- If you are ordering by mail, we accept private and company checks. With MASTERCARD and VISA orders include card number and expiration date. Connecticut residents add 7.5% sales tax.
- Locations more than 1 day away shipped via Federal Express Standard Air service.*
- Federal Express Priority 1 service also available.
- Sorry, we cannot accept COD orders.

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RETURNS

- Defective software will be replaced immediately by the same item. Defective hardware will be replaced or repaired at our own discretion. Call customer service at (203) 378-3662 to obtain a Return Authorization Number before returning goods for replacement. Products purchased in error subject to a 20% restocking fee.

All items subject to availability. Prices subject to change without notice.

*When your order is shipped from our facility in Stratford, CT, Federal Express Standard Air service will deliver the package in 1 to 2 days. This service does not guarantee next day delivery.

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& Phenomenal Prices . .

DataBase Management

Activision Focal Point	59.	Fox Software Fox Base Plus	214.
Business Class or City to City (each)	32.	Fox Base Runtime	162.
Reports for HyperCard	62.	Microsoft Microsoft File 1.05	120.
Acius 4th Dimension	559.	Nantucket Software	
Apple Computer HyperCard	44.	McMax (dBase III Compatible)	179.
Ashton Tate dBASE Mac 1.0	295.	Nashoba Systems FileMaker Plus	149.
Blythe Software Omnis 3 Plus/Express	279.	Odesta Double Helix II	329.
Borland Reflex Plus	165.	ProVUE Development OverVUE 2.1	149.
Chang Laboratories		OverVUE 2.1E	156.
C.A.T. Contacts*Activities*Time	229.	Software Discoveries RecordHolderPlus	45.

Business Software

Apple Computer MacProject	159.	Mac Flow or Mac Schedule	119.
Bravo Technologies MacCalc	83.	Capture	38.
Cricket Software Cricket Graph	119.	Micro Planning Software	
Cricket Presents...	289.	Micro Planner Plus	279.
Pict-O-Graph	105.	Microsoft	
Deneba Software Comment	59.	Microsoft Works 1.1 with Spellswell	189.
Xtra 2.0	109.	Microsoft Multiplan 1.1	120.
Layered		Microsoft Excel 1.04	239.
Notes For Excel or		Microsoft PowerPoint	239.
Microsoft Works (each)	41.	North Edge Software Timeslips III	119.
Legisoft/Nolo Press WillMaker 2.0	30.	Satori Software Bulk Mailer 3.0	79.
Lotus Jazz 1A	189.	Bulk Mailer Plus	195.
Lundeen & Associates		Legal Billing	369.
WorksPlus Commands	Special 60.	Legal Billing II	539.
MacroPac International		Project Billing	409.
101 Macros For Excel	49.	Shana Enterprises Fast Forms	72.
Mainstay Think 'n Time	69.	Turner Hall Publishing MacSQZ!	34.

Word & Outline Processors

Apple Computer MacWrite	99.	Microsoft Write	114.
Living Videotext		MindWork Software MindWrite 1.1	159.
More 1.1C (Color Version)	175.	Symmetry Acta V2.0	36.
Microsoft Microsoft Word 3.01	253.	T/Maker Company WriteNow V2.0	98.

Spelling & Grammar Checkers

Aegis Development		Lundeen & Associates	
Doug Clapp's Word Tools	42.	WorksPlus Spell 1.1	46.
A.L.P. Systems MacProof 3.0		Microlytics, Inc.	
(Requires MacPlus)	115.	Word Finder (Synonym Finder)	35.
Batteries Included Thunder! 1.23	31.	Sensible Software Sensible Grammar	57.
Deneba Software Spelling Coach 3.0		Working Software, Inc.	
(Webster's/Medical/Legal/Hyphenation)	54.	Spellswell 2.0	42.
Spelling Coach 3.0 Professional		Spellswell Medical Dictionary	55.
(Adds Definitions & Thesaurus)	109.	Spellswell Legal Dictionary	24.
Coach Merriam Webster's Thesaurus 2.0	36.	Lookup (Makes Spelling Suggestions)	29.

Desktop Publishing

Addison-Wesley TEXTures	279.	Postcraft International, Inc.	
Aldus Corporation PageMaker 3.0	475.	Laser FX	Special 117.
Allan Bonadio Associates		Laser FX Font Packs #1-8 (each)	30.
Expressionist 1.11	49.	Quark, Inc. QuarkXPress V2.0	Call
Ann Arbor FullWrite Professional	169.	Solutions, International	
Boston Publishing Systems		Super Glue	52.
The MacPublisher III	119.	Target Software Scoop	295.
Letraset Ready, Set, Go! 4.0	279.	Word Perfect Corporation	
ImageStudio	279.	Word Perfect for the Macintosh	189.

Accounting Packages

Aatrix Software Aatrix Payroll V3.0	129.	Rags to Riches GL, AR, or AP	120.
Chang Labs		Layered Insight One Write	189.
Free Inventory or Professional Billing		MECA	
with Purchase of 3-Pak!		Managing Your Money	137.
New Enhanced Version III Modules!		Migent In House Accountant	119.
Rags to Riches 3-Pak 3.1		Monogram	
(GL/AR/AP)	Special 279.	Business Sense	279.
Professional 3-Pak		Dollars & Sense 4.0	81.
(GL/Professional Billing/Payables)	359.	Peachtree	
Retail Business 3-Pak		Back To Basics 3-Pak (GL/AR/AP)	139.
(GL/AP/Inventory Control)	359.	Survivor Software	
Inventory Control 2.6 or		MacMoney 3.0	
Professional Billing 2.6	239.	(Enhanced Version)	69.

Statistics & Math Packages

BrainPower		Borland Eureka! The Solver	129.
StatView 512 Plus	175.	Systat Systat 3.1 (Specify Mac 512K,	
Math View Professional	145.	MacPlus, or Mac II)	459.

Graphics Software

ABA Software Draw It Again Sam...	89.	Micro: Maps MacAtlas Paint Version	32.
Adobe Systems Adobe Illustrator		MacAtlas Professional	129.
(MacPlus, SE & Mac II)	379.	Miles Computing	
Aldus Freehand	389.	Mac The Ripper, Orchestra of Fonts,	
Alisys Corp. FONtastic Plus	47.	People-Places-Things, or	
Fontographer 2.2	239.	Taking Care of Business (each)	27.
Ann Arbor Softworks Full Paint	49.	Mindscape GraphicWorks 1.1	84.
Apple Computer MacPaint	99.	Olduvai Software Post-ART (3-Disk Set)	35.
Broderbund Print Shop	37.	Silicon Beach Software SuperPaint	79.
Casadyware Fluent Fonts 2.0 (2-Disk Set)	26.	Digital Darkroom	107.
Fluent Laser Fonts Vol. 1-18 (ea)	45.	Silicon Press	41.
Computer Friends Modern Artist	109.	Solutions International	
Deneba Software Canvas 1.0		The Curator (Catalog Your Art)	79.
(Includes Desk Accessory)	Special 109.	Springboard Certificate Maker	24.
Canvas DA	59.	SuperMac Software Pixel Paint	259.
Dubl-Click Software		Symmetry PictureBase 1.2	59.
World Class Fonts! (Both Volumes)	36.	T/Maker	
WetPaint (Both Volumes)	36.	Click Art Letters I, Letters II, Personal	
Enzan-Hoshigumi USA		Graphics, Publications, Effects,	
MacCalligraphy 2.0	109.	Business Image, or Holidays (each)	28.
Japanese Clip Art Scroll I		Christian Images	35.
"Heaven" or Scroll 2 "Earth"	52.	Click Art EPS Illustrations	Call
Japanese Clip Art "Borders" Scroll	69.	Click Art Laser Fonts: Plymouth,	
Foundation Publishing Comic People	26.	Bombay, or Seville (each)	45.
Comic Strip Factory	45.	Unison World Chest Top Publishing	34.
Macromind Videoworks II	118.	Zedcor DeskPaint 1.0	39.

CAD Products

Apple Computer MacDraw	159.	Enabling Technologies Easy 3D	79.
Challenger Software		Innovative Data Design MacDraft 1.2B	149.
Mac 3D (Enhanced Version 2.0)	119.	Silicon Beach Software Super 3D	159.
Cricket Software Cricket Draw	169.	Super 3D Enhanced (Mac II)	249.

Educational/Creative Software

Baron's Baron's SAT	35.	Great Wave Software TimeMasters	22.
Bogas Productions Studio Session	52.	Kids Time or NumberMaze	26.
Broderbund Jam Session	30.	CrystalPaint	32.
Geometry, Calculus or Physics	62.	Concertware+ 4.0 or American Discovery	39.
Type!	31.	Concertware+ MIDI 4.0	79.
Where in the World is Carmen San Diego	25.	Hayden MusicWorks	29.
Coda Mac Drums	26.	Score Improvement System for the SAT	58.
Compu-Teach Once Upon A Time	23.	Learning Company Reader Rabbit	34.
Stepping Stones Level I or Level II	23.	Mindscape Perfect Score SAT	
Davidson & Associates Speed Reader II	39.	w/The Perfect College	46.
Math Blaster or Word Attack!	27.	Nordic Software	
Electronic Arts		MacKids Educational Programs (each)	29.
Deluxe Music Construction Set V2.0	61.	Rubicon Publishing	
1st Byte/Electronic Arts		Dinner at Eight-Silver Palate Bundle	51.
Kid Talk, Speller Bee,		Simon & Schuster Typing Tutor IV	35.
First Shapes, or Math Talk	32.	Speed Reading Tutor IV	32.
MathTalk Fractions, First Letters &		Springboard Early Games for	
Words, or Smoothtalker	32.	Young Children or Easy as ABC	28.

Disk Drives/Hard Disks/Upgrades

AST Research		SCSI Interface/Port	85.
Mac86 Co-Processor (Mac SE)	419.	MacSnap Toolkit (torx driver,	
Mac286 Co-Processor (Mac II)	1049.	opener & grounding set)	15.
Central Point		Everex 20D (20Mg Hard Disk)	520.
Central Point 800K External Drive	185.	20 Deluxe	585.
Copy II PC Deluxe Option Board	129.	MacMemory, Inc.	
CMS 20MB External Subsystem		Turbo SE (16 Mhz 68000	
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4MB for MacPlus/SE)	879.	for Mac SE & Mac II)	829.

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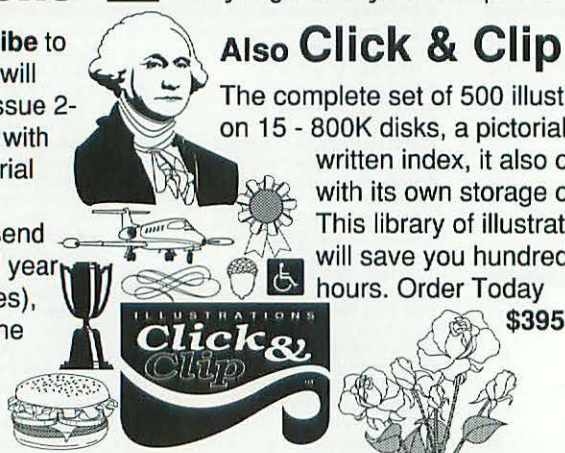
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52-week Year Planner

1988 Year Planner												
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Reading (Part II)

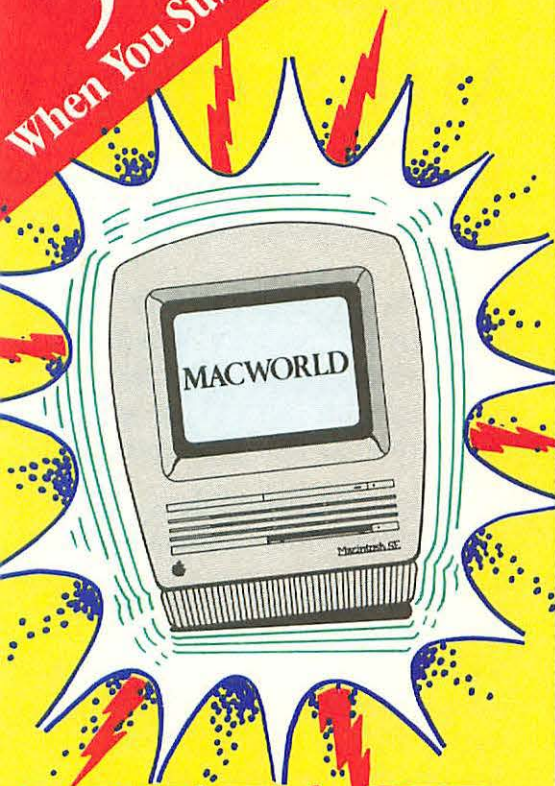
Time	Activity	Notes
7:00	Wake up	
7:15	Get dressed	
7:30	Breakfast	
7:45	Leave home	
8:00	Arrive at school	
8:15	First lesson	
8:30	Second lesson	
8:45	Third lesson	
9:00	Fourth lesson	
9:15	Fifth lesson	
9:30	Sixth lesson	
9:45	Seventh lesson	
10:00	Eighth lesson	
10:15	Ninth lesson	
10:30	Tenth lesson	
10:45	Eleventh lesson	
11:00	Twelfth lesson	
11:15	Thirteenth lesson	
11:30	Fourteenth lesson	
11:45	Fifteenth lesson	
12:00	Lunch break	
12:15	Sixteenth lesson	
12:30	Seventeenth lesson	
12:45	Eighteenth lesson	
13:00	Nineteenth lesson	
13:15	Twentieth lesson	
13:30	Twenty-first lesson	
13:45	Twenty-second lesson	
14:00	Twenty-third lesson	
14:15	Twenty-fourth lesson	
14:30	Twenty-fifth lesson	
14:45	Twenty-sixth lesson	
15:00	Twenty-seventh lesson	
15:15	Twenty-eighth lesson	
15:30	Twenty-ninth lesson	
15:45	Thirtieth lesson	
16:00	End of school	
16:15	Home	
16:30	Homework	
16:45	Free time	
17:00	Dinner	
17:15	Free time	
17:30	Free time	
17:45	Free time	
18:00	Free time	
18:15	Free time	
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22:30	Free time	
22:45	Free time	
23:00	Free time	
23:15	Free time	
23:30	Free time	
23:45	Free time	
24:00	End of day	

Month Calendar

September 1987

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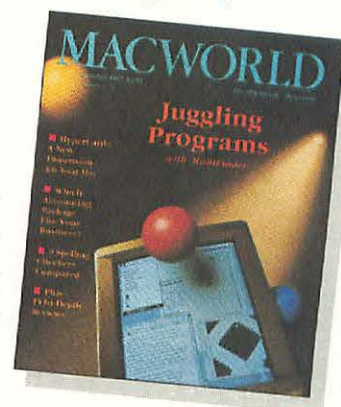
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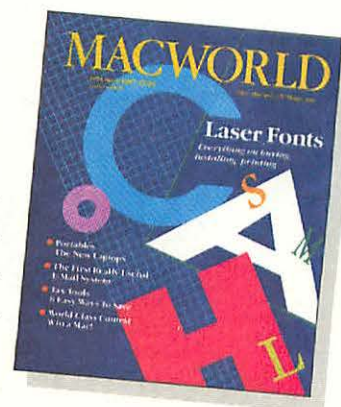
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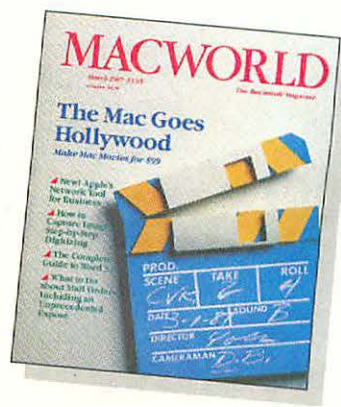
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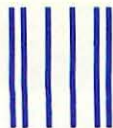
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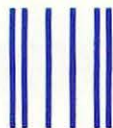
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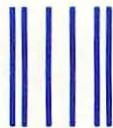
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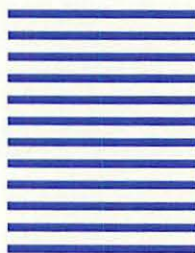
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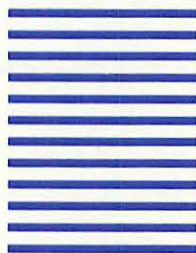
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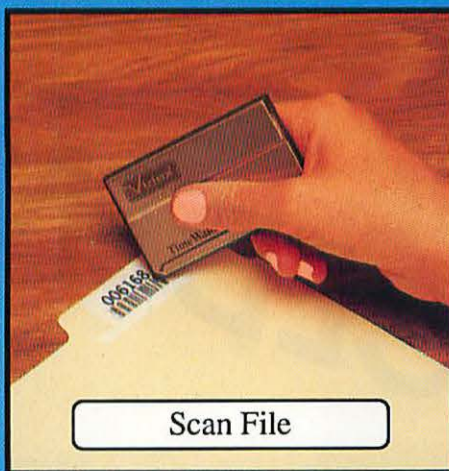
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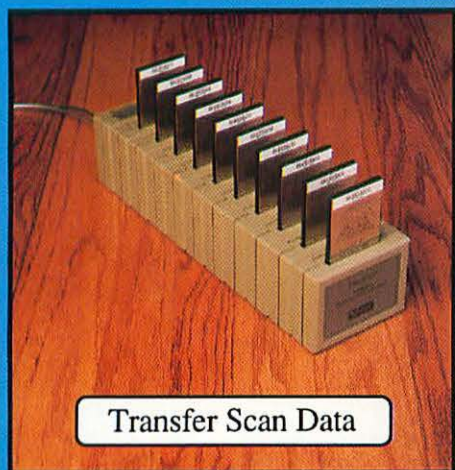
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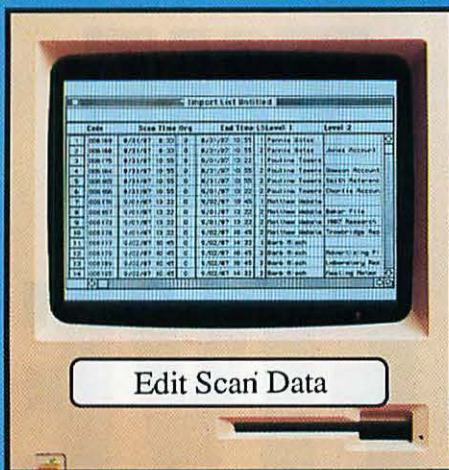
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006165	Smith Reference	Pauline Towers	8/31/87
006166	Charlie Account	Pauline Towers	8/31/87
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006173	1987 Research Budget	Matthew Webster	9/01/87
006178	Trowbridge Report	Matthew Webster	9/01/87
006179	Advertising Plan	Barb Misch	9/02/87
006189	Laboratory Results	Barb Misch	9/02/87
006195	Meeting Notes	Barb Misch	9/02/87
006182	Garth Correspondence	Pennie Bates	9/02/87
006183	July Computer Sales	Pennie Bates	9/02/87
006184	Commerce Study	Pennie Bates	9/02/87
006185	Teller Audit	Matthew Webster	9/03/87
006186	Product Specification	Matthew Webster	9/03/87
006187			9/03/87
006188			9/03/87

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Applications for the TimeWand - Document Control

Ever wonder who has that important file on the Jones account? There is no record of who took it from the file room and no one remembers who had it last. You spend your valuable time and patience tracking it down, but when you finally locate the file, it may be too late for timely use.

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Noncomputer-related businesses

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- ☐ 3. Business consulting (noncomputer-related)
- ☐ 4. College/university
- ☐ 5. Elementary/high school
- ☐ 6. Engineering/architecture
- ☐ 7. Finance, banking, accounting, insurance, real estate
- ☐ 8. Government
- ☐ 9. Health/medical services
- ☐ 10. Legal services
- ☐ 11. Manufacturing
- ☐ 12. Military
- ☐ 13. Other business services
- ☐ 14. Publishing/advertising/public relations
- ☐ 15. Research and development
- ☐ 16. Retail/wholesale
- ☐ 17. Transportation, communications, utilities
- ☐ 98. Other (specify) _____

Computer-related businesses

- ☐ 18. Computer consultant
- ☐ 19. Computer retail
- ☐ 20. Distributor/wholesaler
- ☐ 21. Manufacturer (computers, software, peripherals)
- ☐ 22. Service bureau
- ☐ 23. VAR/systems house/integrator
- ☐ 99. Other (specify) _____

2. Title (check only one)

- ☐ A. Chairman/president/owner/partner
- ☐ B. Vice president
- ☐ C. Controller/treasurer/accountant
- ☐ D. Director/supervisor/manager
- ☐ E. Project manager/chief/group leader
- ☐ F. Art director/writer/chief/group leader
- ☐ G. Engineer/scientist
- ☐ H. Administrator
- ☐ I. Consultant/advisor
- ☐ J. Microcomputer specialist/manager/analyst
- ☐ K. Programmer
- ☐ L. Educator
- ☐ M. Professional (lawyer, doctor, etc.)
- ☐ Z. Other (specify) _____

3. Department or function (check only one)

- ☐ A. Accounting/finance
- ☐ B. Administration/management/personnel
- ☐ C. Consulting
- ☐ D. Education/training
- ☐ E. Engineering/R&D
- ☐ F. Manufacturing/production
- ☐ G. Microcomputer center/office automation
- ☐ H. MIS/DP
- ☐ I. Purchasing
- ☐ J. Sales/marketing/distribution
- ☐ Z. Other (specify) _____

4a. Does your company own or lease any mainframe computers at this location?

☐ Yes (indicate quantity below) ☐ No

- | | Existing
(quantity) | Plan to buy
(quantity) |
|--|------------------------|---------------------------|
| <input type="checkbox"/> 1. IBM | _____ | _____ |
| <input type="checkbox"/> 99. Other (specify) | _____ | _____ |

4b. Does your company own or lease any mini-computers at this location?

☐ Yes (indicate quantity below) ☐ No

- | | Existing
(quantity) | Plan to buy
(quantity) |
|--|------------------------|---------------------------|
| <input type="checkbox"/> 1. IBM | _____ | _____ |
| <input type="checkbox"/> 2. DEC VAX | _____ | _____ |
| <input type="checkbox"/> 3. Sun/Apollo | _____ | _____ |
| <input type="checkbox"/> 99. Other (specify) | _____ | _____ |

5. Does your firm have or plan to buy any of the following types of personal computers or microcomputer systems at your location?

☐ Yes (indicate quantity below) ☐ No

- | | Currently
own | Plan to buy
within 1-12 mos. |
|---------------------------|------------------|---------------------------------|
| 1. Macintosh 128/512 | _____ | _____ |
| 2. Macintosh Plus | _____ | _____ |
| 3. Macintosh SE | _____ | _____ |
| 4. Macintosh II | _____ | _____ |
| 5. IBM or compatible | _____ | _____ |
| 6. Sun/Apollo workstation | _____ | _____ |
| 99. Other (specify) | _____ | _____ |

6. Please indicate your involvement with each of the following types of personal computers or microcomputer systems (check all that apply)

- | | Macintosh | Software | Networks &
Peripherals |
|---|-----------|----------|---------------------------|
| A. Approve purchase | A. _____ | A. _____ | A. _____ |
| B. Develop/manufacture | B. _____ | B. _____ | B. _____ |
| C. Evaluate/select vendor | C. _____ | C. _____ | C. _____ |
| D. Own one | D. _____ | D. _____ | D. _____ |
| E. Own two or more | E. _____ | E. _____ | E. _____ |
| F. Purchase or acquire | F. _____ | F. _____ | F. _____ |
| G. Establish specifications | G. _____ | G. _____ | G. _____ |
| H. Recommend to others | H. _____ | H. _____ | H. _____ |
| I. Sell | I. _____ | I. _____ | I. _____ |
| J. Train people to use/
or provide support | J. _____ | J. _____ | J. _____ |
| K. Use | K. _____ | K. _____ | K. _____ |
| L. No involvement | L. _____ | L. _____ | L. _____ |
| Z. Other (specify by
name and quantity) | Z. _____ | Z. _____ | Z. _____ |

If you have no involvement with any of the above, skip to question 8.

7. Do you recommend, buy, specify or approve microcomputers, software, and/or peripherals?

☐ Yes ☐ No

If yes, please indicate for how many Macintosh personal computers you have this involvement. (check only one)

- | | |
|-----------------------------------|---|
| <input type="checkbox"/> A. 1-3 | <input type="checkbox"/> E. 50-99 |
| <input type="checkbox"/> B. 4-9 | <input type="checkbox"/> F. 100-499 |
| <input type="checkbox"/> C. 10-19 | <input type="checkbox"/> G. 500+ |
| <input type="checkbox"/> D. 20-49 | <input type="checkbox"/> H. None of the above |

8. How many people are employed by your entire company? (check only one)

- | | | |
|-----------------------------------|---------------------------------------|--|
| <input type="checkbox"/> A. 1-9 | <input type="checkbox"/> D. 100-499 | <input type="checkbox"/> G. 2500-4999 |
| <input type="checkbox"/> B. 10-24 | <input type="checkbox"/> E. 500-999 | <input type="checkbox"/> H. 5000-9999 |
| <input type="checkbox"/> C. 25-99 | <input type="checkbox"/> F. 1000-2499 | <input type="checkbox"/> I. 10,000 or more |

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15. Please list below any individuals at this location who also help to recommend, specify, acquire or approve the purchase of computer systems, peripherals, software or services to whom you would like us to send a complimentary subscription of Macintosh Today.

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Name: _____	Title: _____
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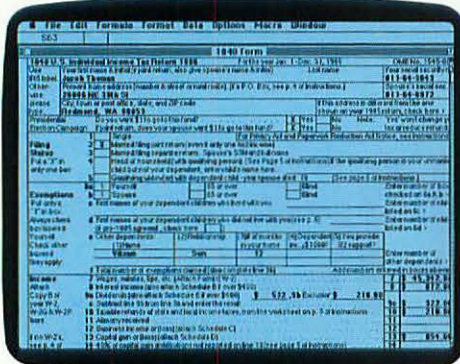
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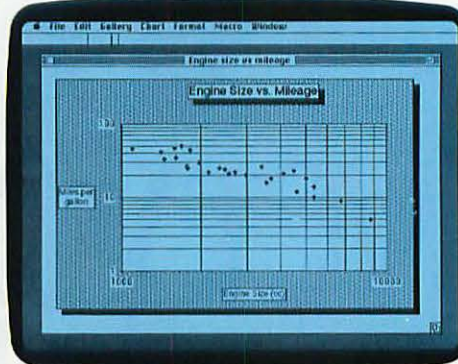
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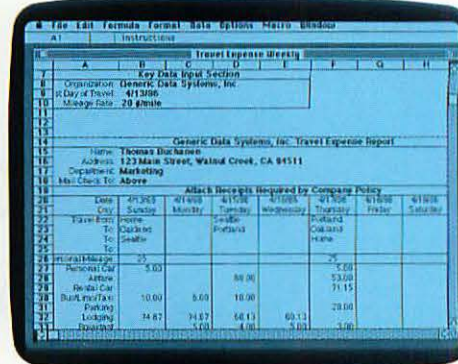
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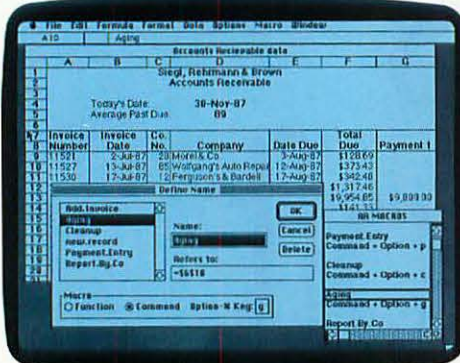
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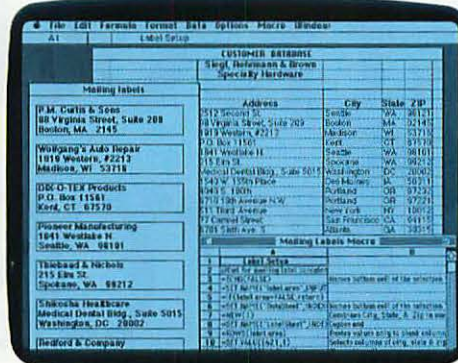
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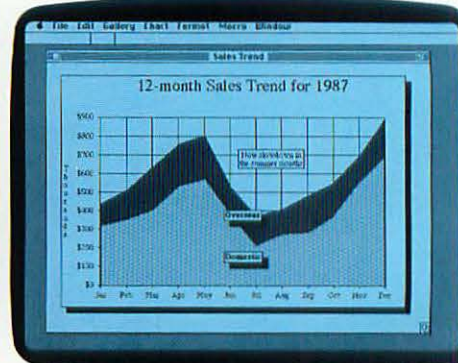
Prepare expense reports.



Manage accounts receivable.



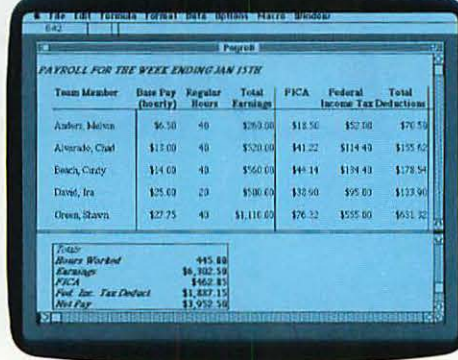
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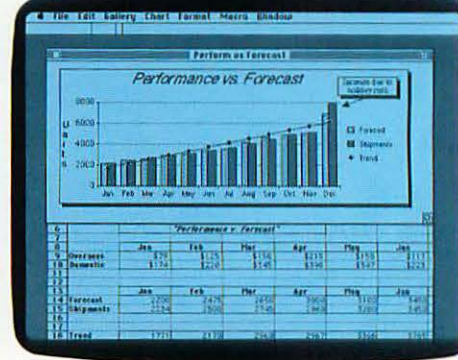
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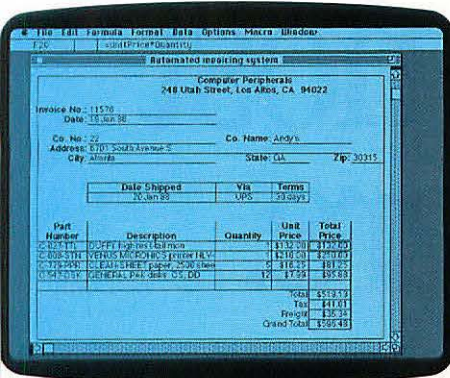
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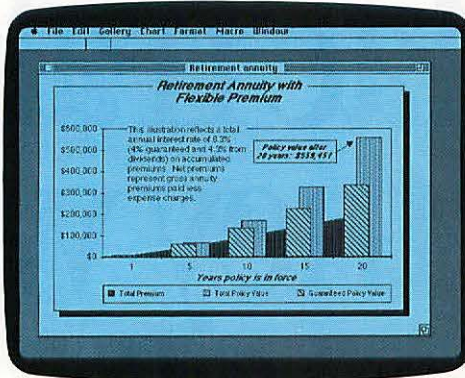
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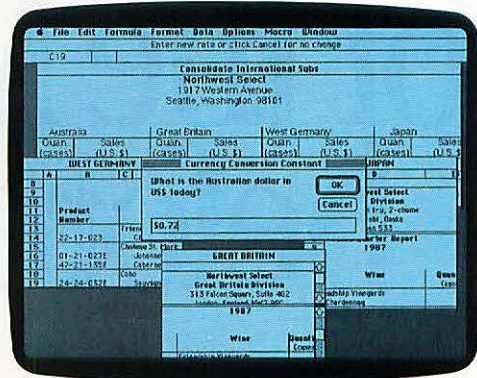
do things like this.



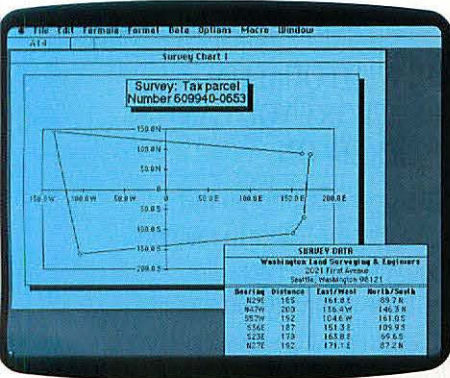
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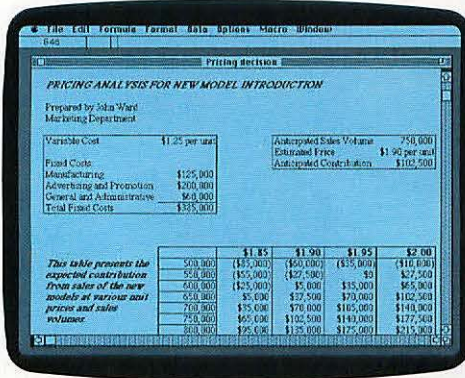
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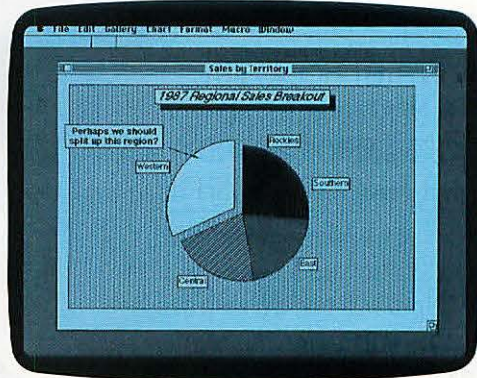
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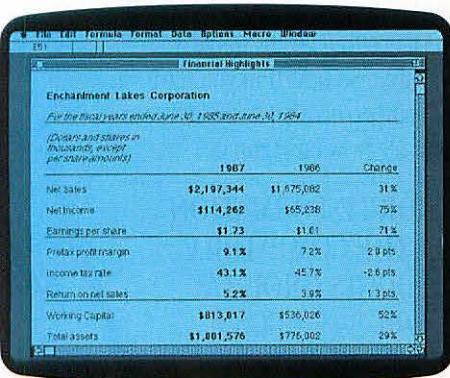
Survey land.



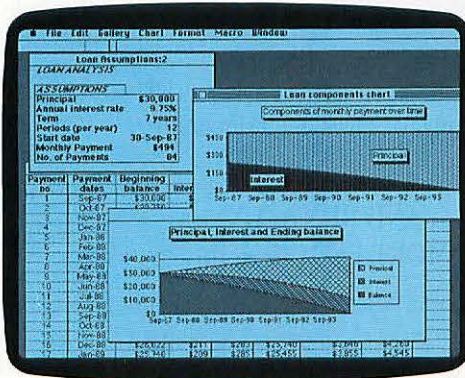
Make pricing decisions.



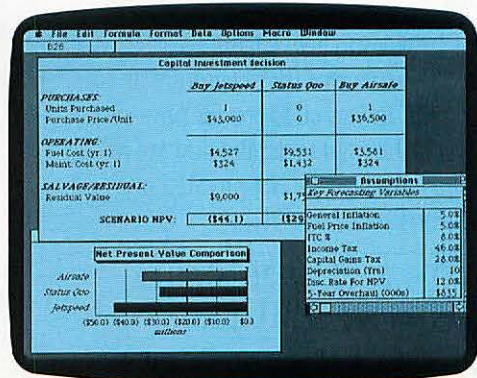
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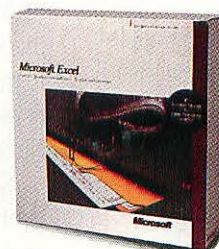


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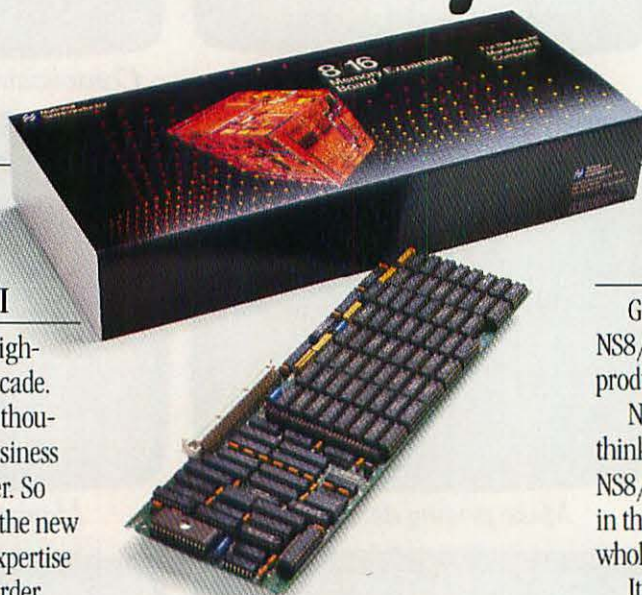
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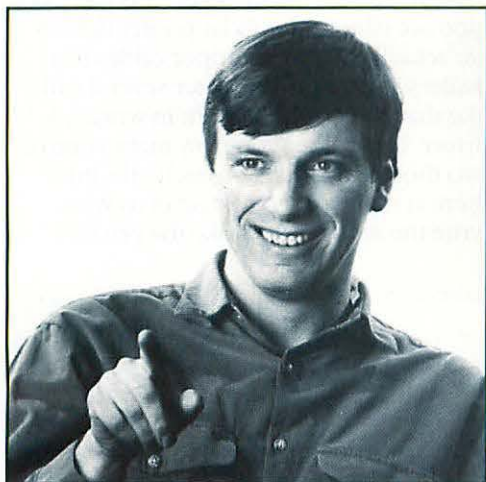
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An interview with Cricket Software chairman Jim Rafferty



Jim Rafferty is chairman and co-founder of Cricket Software. His company, based in Malvern, Pennsylvania, has become one of the leading suppliers of graphics software for the Macintosh, including Cricket Draw and Cricket Graph. He and Darragh Muldoon founded the firm only two years ago, and they now predict over \$20 million in annual sales for 1988.

How did you start Cricket Software?

I had become interested in personal computers while in graduate school. In the fall of 1983, I read about this new computer from Apple, the Macintosh. I determined that if I was ever to get into computers, this was the time. I pirated a copy of *Inside Macintosh* and tried to read it. I was in tears, it was so poorly written.

That experience made me realize that everyone would be starting from the ground up in Mac programming, so I had a chance equal to any other developer.

Then on January 24, 1984, when the Mac was released, I was in line before my local Apple dealer opened, waiting with a check for \$2498 in my hand. I couldn't afford a disk drive or an ImageWriter. I familiarized myself with the user interface, and I was convinced that it was the best personal computer ever built.

What was your idea for the company?

I'd been thinking about how horribly clumsy mainframe graphics programs for data analysis were. So I started with a graphics product that became Stat Works. It took one year and three months to do in Lisa Pascal; the learning curve for Mac programming is horrendous.

Microsoft and Forethought declined to publish Stat Works, and we eventually contracted with an English company, Heyden & Son (not the American Hayden), to publish it.

What about the name of the company?

Cricket? That had been my nickname as a kid. I tried it on Darragh and she liked it. We knew that establishing the name would be a hump to get over. But we knew Cricket would stick.

Guy Kawasaki wrote me a letter after he had seen our product, saying that it was great but we would have to change our name. I wrote him back and said that was a strange recommendation coming from someone at a company named Apple.

How big is Cricket today?

We've moved into a new 30,000-square-foot facility with 60 people. In late 1987 we had our first million-dollar month.

What's next?

Pict-O-Graph has just been shipped. We've heard from many people that it is a real sleeper product for business graphics. In 1988 we'll have Cricket Presents, Cricket Device Drivers, and a black-and-white paint package.

Why another paint package?

This one will have a lot of creative features that make it easier to use than the others: better user modification of the air brush, polygon drawing tools, and a polygon drawing and manipulation feature that we call "spirograph." It's very fast in scrolling. It reads TIFF, PICT, and Paint files. It can also read scanned images, but not gray-scale images.

The bulk of installed scanners are only bilevel—that is, they don't use gray-scale information. The new 8-bit devices are only for the Mac II, whereas our program will be for the majority of users. It will also read files from the other products in our line: Cricket Draw, Cricket Graph, et cetera.

(continues)



Creating drivers that work with all applications is tough. That's why we develop them only for our products.

How will it compare to SuperPaint?

It has a feature I call "wet paint" that allows an element of the image be treated as an object while you work with it. Afterwards it becomes part of the bitmap. That way we provide object-oriented editing and bitmap editing without confusing the user with two layers in the program. We have other products planned for the third quarter, but I can't talk about them this far in advance, as I could in the old days. The market is more competitive now.

About the device drivers: what is a driver?

A driver offers a way to take a screen image to hard copy, whether it's to film in a cam-

era, to transparency, or to paper. The Cricket Device Drivers family will be selectable from the Chooser. They'll drive color ink-jet, color thermal, and black-and-white laser printers, and film recorders. The package will include drivers for systems that service bureaus use to produce slides via modems.

SoftStyle, one of the other companies that writes printer-driver programs for the Macintosh, has recently been acquired by Phoenix, the company that developed IBM PC BIOS clone firmware. Any conjecture about what they have planned?

SoftStyle may be planning a full line of drivers, as we are, but we feel that our expertise and experience in graphics gives us a definite edge.

Creating drivers that work with all applications is tough. The classic case is Microsoft, which does not do printer-management according to Apple rules. Developers must find ways they can fudge these problems. That's why we develop drivers only for our own products.

Printer-driver development has been a chronic problem for IBM users. Are similar problems developing for Mac users?

Yes. We're spending more time serving printer markets. The driver business is funky. Maybe I write one and sell it for \$100. If it doesn't work, I get calls daily. But nine out of ten calls about printer drivers are actually due to improper cables that dealers sold to people. After several calls like that, there is little profit in writing a driver. The printer company makes one or two thousand dollars on each sale, but there is no margin for those of us who write the software to make the printers

(continues)



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MORE FOR YOUR MAC...

UTILITIES

Affinity	
Tempo II	89.00
ALSoft	
DiskExpress	38.00
Font/DA Juggler Plus	44.00
Berkeley System Design	
Stepping Out (full screen w/o scrolling)	59.00
CE Software	
DiskTop 3.0	31.00
QuickKeys (new macro programmer)	62.00
Central Point	
Copy II Mac (with MacTools)	20.00
Emerald City Software	
Lasertalk 1.0	187.00
Ideaform	
Disk Quick (hard disk organizer)	27.00
IntelliSoft	
Bookmark	61.00
Kent Marsh	
MacSafe	94.00
NightWatch	109.00
Mainstay	
Capture	47.00
TypeNow	30.00
Microanalyst	
MacZap (disk utility)	36.00
Olduvai	
DA Switcher II	63.00
Font Share	159.00



Draw It Again, Sam (Aba Software)
— Object-oriented drawing program with unlimited graphics/text libraries. (graphics) \$95

Software Research

MacTree	38.00
Software Supply	
Power Station	38.00
Suitcase	38.00
SuperMac	
DiskFit	54.00
Sentinel 1.0	155.00
Super Spool	49.00
Super Laser Spool - Single User	82.00
William & Macias	
MyDiskLabeler-Color	31.00
MyDiskLabeler-LaserWriter	34.00
Working Software	
Findswell	29.00

DESK ACCESSORIES

Activision	
Focal Point	62.00
Affinity	
AffiniFile	49.00
Allan Bonadio Associates	
Expressionist (equation editor)	49.00
Borland	
Sidekick 2.0	65.00
Electronic Arts	
Disk Tools Plus	31.00
Greene	
QuickDEX	24.00
Imagine	
Smart Alarms and Appointment Diary	35.00
Mainstay	
Think'n Time	61.00
Olduvai	
Icon-It!	48.00
Solutions	
Smart Scrap & The Clipper	37.00

Symmetry

HyperDA	38.00
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LANGUAGES

Borland	
Turbo Pascal	59.00
Consulair	
68000 Development System	59.00
Icom Simulations	
TMON (debugger)	94.00
Microsoft	
Basic Compiler 1.0	119.00
Basic Interpreter 3.0	61.00
Fortran Compiler 2.2	169.00
Think Tech	
Lightspeed C (super compiler)	95.00
Lightspeed Pascal	65.00
Zedcor	
ZBasic	65.00

COMMUNICATIONS

CompuServe	
CompuServe Subscription Kit	24.00
Data VIZ	
MacLink Plus w/Cable	145.00
Dow Jones	
Desktop Express	96.00
FreeSoft	
Red Ryder 10	49.00
Hayes	
Smartcom II (communications)	88.00
Software Ventures	
Microphone 1.1 (includes Glue)	119.00

DATABASE SOFTWARE

1st Desk Systems	
1st File	59.00
Acus	
4th Dimension	600.00
Ashton-Tate	
dBase Mac	295.00
Borland	
Reflex Plus	165.00
Nashoba Systems	
Filemaker Plus	149.00



MacSQZ! (Turner Hall/Symantec) — Reduce on-disk size of Excel spreadsheets by up to 95%. Password protection and file history. (business) \$59

Odesta	
Double Helix II	349.00
Software Discoveries	
Record Holder Plus	45.00

BUSINESS SOFTWARE

1st Desk Systems	
1st Merge	59.00
Activision	
Business Class	30.00
Borland	
Eureka: The Solver	129.00
Bravo	
MacCalc	79.00
Cricket	
Cricket Graph (advanced graphing)	119.00
Cricket Presents	310.00
Deneba Software	
Comment 1.1 (post notes to files)	59.00
Microsoft	
Excel 1.04	265.00
PowerPoint	249.00
Works 1.1 (integrated software)	185.00
North Edge Software	
Timeslips III (time and expense tracking)	119.00
Satori	
Bulk Mailer 3.0	80.00

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ORDERS NOW SHIPPED



Select Micro Systems	
FlowMaster	369.00
Shana Enterprises	
FastForms! Construction Kit	96.00
Softview	
MacInUse (tracks usage)	42.00
Turner Hall Division/Symantec	
MacSQZ!	59.00

WORD PROCESSORS AND OUTLINERS

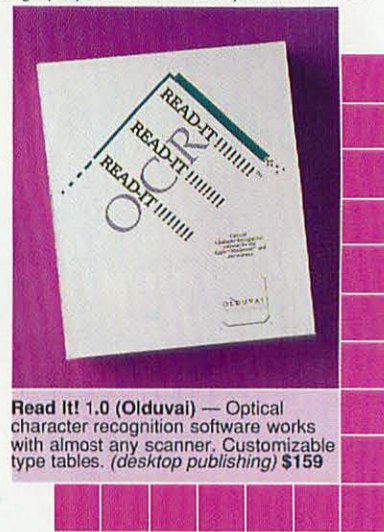
Bootware Software	
Pro Resume Writer (multiple resumes)	75.00
Microsoft	
Word 3.01 (updated word processor)	239.00
Write 1.0 (new word processor)	111.00
T-Maker	
Write Now (word processor)	98.00

SPELLING CHECKERS

Aegis	
Doug Clapps Word Tools	42.00
Deneba Software	
Spelling Coach 3.0	59.00
Spelling Coach Pro	109.00
Coach Merriam-Webster Thesaurus	36.00
Electronic Arts	
Thunder (spelling checker)	30.00
Microlytics	
Word Finder (synonym finder)	39.00
Working Software	
Spellswell 2.0 (spelling checker)	42.00

GRAPHICS

Aba Software	
Draw It Again Sam	95.00
Activision	
Postcards	20.00
Ann Arbor	
Full Paint (full screen graphics)	49.00
Broderbund	
Print Shop (cards and more)	36.00
CE Software	
CalendarMaker	27.00
Cricket	
Cricket Draw	169.00
Pictograph (color on the Mac II)	105.00



Read It! 1.0 (Olduvai) — Optical character recognition software works with almost any scanner. Customizable type tables. (desktop publishing) \$159

Deneba Software	
Canvas	119.00
Dubl-Click	
Wet Paint - Both Volumes	36.00
Enzan-Hoshigumi	

Required Reading!

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We've been behaving like groundhogs for months preparing what we believe is the consummate Macintosh Products Catalog. Friends and family dropped by the wayside as we spent every waking hour testing, reviewing and photographing hundreds of great products for the Mac! The 56 page color catalog is as much an informative "handbook" as it is a source for your Macintosh needs. Any product can be found instantly by using our color-coded indexing system. And once you're there all the product information is at your fingertips. Questions on copy protection, compatibility (both hardware and software) and function are answered in lively text punctuated with full-color photographs and informative screen dumps.

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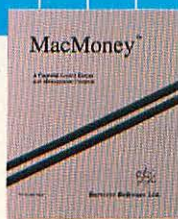
800k EXTERNAL DRIVE



From Cutting Edge comes our most popular external floppy drive. Reads and writes 400/800K disks and is compatible with all ROM's. Convenient front panel eject switch. **Only \$179**

MacMONEY

This versatile, powerful and intuitive accounting package from Survivor Software has been developed specifically for your personal and small business use. Complete and easy to use. Full double-entry personal bookkeeping



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MWEB



system and financial planning too. Integrates with MacInTax. Requires 512K. **\$65**

EMAC DRIVE



This zero footprint 20Mb hard drive from Everex comes with built-in SCSI intelligent controller and driver installed. Utility software, terminating resistor and connecting cables are included. Quiet running, fast data transfer, automatic head park and good looks compliment this top performer. **Just \$595.00**

SPELLING COACH

Deneba's best selling spelling checker desk accessory is compatible with over 95% of Macintosh software. Interactive features include as-you-type spelling checks and one-key corrections. Checks sections or a complete document at over 150 words per second. Includes Merriam-Webster's dictionary, Legal and Medical libraries. **\$59.00**

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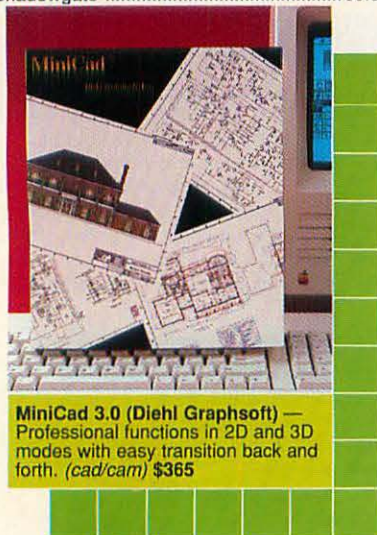
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Circle 78 on reader service card

FROM MacWAREHOUSE™

Artworx	
Bridge 5.0	22.00
Avalon Hill	
MacPro Football	28.00
Broderbund	
Ancient Art of War (battle strategy)	27.00
Bullseye	
Ferrari Grand Prix (racing)	32.00
Fokker Triplane Flight Simulator	32.00
Electronic Arts	
Chessmaster 2000 (deluxe chess)	28.00
Patton vs. Rommel (strategy)	27.00
Scrabble (word game)	27.00
Skyfox (3-D dogfight)	15.00
Epyx	
Sub Battle Simulator	24.00
Greene	
Crystal Quest	28.00
Infinity	
Go	31.00
Infocom	
Beyond Zork	30.00
Hitchhikers Guide (the classic)	18.00
Leather Goddesses of Phobos	24.00
Microsoft	
Flight Simulator 1.0	32.00
Micro Sports	
MSFL Pro League Football	32.00
MSFL Pro Draft (create teams)	26.00
Miles	
Harrier Strike Mission II	27.00
Mindscape	
Balance of Power	30.00
Deja Vu (who done it)	30.00
Shadowgate	30.00



MiniCad 3.0 (Diehl Graphsoft) — Professional functions in 2D and 3D modes with easy transition back and forth. (cad/cam) \$365

Trust & Betrayal: The Legacy of Siboot	30.00
Uninvited	30.00
PBI	
Strategic Conquest Plus	46.00
Practical Computer	
MacCourses	34.00
MacGolf 2.0	36.00
MacRacketball	36.00
Primera	
Smash Hit Racketball II	22.00
Sierra On-Line	
Leisure Suit Larry	23.00
Silicon Beach	
Apache Strike	27.00
Dark Castle	26.00
Beyond Dark Castle	32.00
World Builder (game maker)	41.00
Simon & Schuster	
Star Trek - Kobayashi Alternative	24.00
Simulated Environment Systems	
Quarterstaff	29.00
Sir Tech	
Wizardry (classic fantasy)	35.00
Sphere/Spectrum HoloByte	
Falcon	26.00
Gato (submarine adventure)	26.00

DISK DRIVES/MEMORY UPGRADES

AST	
AST 2000(20 meg-20 meg tape)	1399.00
AST 4000(74 meg-60 meg tape)	3799.00

Central Point	
800K Laser Drive	195.00
CMS	
MacStack 20 Meg	615.00
MacStack 40 Meg	925.00
MacStack 60 Meg	990.00
MacStack 80 Meg	1,365.00
Cutting Edge	
800K Disk Drive	179.00
Dove	
Mach II/SE Accelerator Board	599.00
MacSnap 2SE	299.00
MacSnap SCSI Interface Port	85.00
MacSnap 524 (512k to 1 meg)	175.00
MacSnap 524S (incl SCSI interface)	219.00
MacSnap 548 (512k to 2 meg)	389.00
MacSnap 548S (incl SCSI interface)	449.00
MacSnap Plus 2 (MacPlus to 2 meg)	279.00
MacSnap 8S cmos (Mac II to 8 meg)	1,929.00
MacSnap Tool Kit (installation tools)	14.00
Everex	
EMAC 20D (hard drive)	525.00
EMAC 20D Deluxe (0 footprint)	595.00
EMAC 40D (hard drive)	945.00
EMAC 40D Deluxe (0 footprint)	995.00
EMAC 60T (tape backup)	895.00
IOMEGA	
Bernoulli Box (dual 10 meg)	1,419.00
Bernoulli Box (dual 20 meg)	1,849.00
MacWarehouse	
MacWarehouse ED20	559.00
Mirror	
MagNet 20X	729.00
MagNet 30X	799.00
MagNet 40/40	1,899.00
MagNet 40X	1,199.00
MagNet 85X	2,899.00
Magnum Tape 20 Backup	829.00
PCPC	
MacBottom HD21 (SCSI)	749.00
MacBottom HD21 (SCSI) w/Modem	915.00
MacBottom HD32 (SCSI)	899.00
MacBottom HD32 (SCSI) w/Modem	1,045.00
MacBottom HD45 (SCSI)	1,159.00
MacBottom HD45 (SCSI) w/Modem	1,295.00
Rodime Systems	
20 Plus External or Internal Drive	745.00
45 Plus External Drive	1,060.00
45 Plus Internal Drive	1,170.00
MODEMS	
Everex	
EMAC 2400	245.00
Hayes	
Smartmodem 1200	299.00
Smartmodem 2400	489.00
Migent	
Pocket Modem (ext. 300/1200 baud)	168.00
Novation	
Parrot Pocket Modem (with software)	99.00
Shiva	
NetModem 1200 (modem for network use)	450.00
US Robotics	
Courier 1200 Modem	199.00
Courier 2400 Modem	349.00

BLANK MEDIA

Goldstar	
DS/DD (box of 10)	15.00
Maxell	
DS/DD (box of 10)	20.00
SS/DD (box of 10)	14.00
Sony	
DS/DD (box of 10)	19.00
SS/DD (box of 10)	13.00

INPUT/OUTPUT

Abaton	
ProPoint	119.00
Asher Engineering	
Turbo Trackball (512/Plus or SE/II)	79.00
Cambridge Auto	
Numeric Ease	32.00
DataDesk	
Mac 101 Keyboard	141.00
Kensington	
Turbo Mouse	81.00
Turbo Mouse ADB (for SE and Mac II)	81.00
Koala	
MacVision (digitizer)	169.00
Kraft	
3 Bottom QuickStick	39.00
Lightgate	
Felix	99.00
Mouse Systems	
A+ Mouse (512, Plus)	69.00
A+ Mouse ADB (SE, II)	89.00

New Image

MacScan (feed-thru)	1,189.00
MacScan (flatbed)	1,749.00
Olduvai	
ADBridge	105.00
Seikosha America	
Seikosha Printer (dot-matrix)	229.00
Summagraphics	
Bit Pad Plus	339.00
MacTablet 6 x 9	289.00
MacTablet 12 x 12	379.00
ThunderWare	
ThunderScan 4.0 (incl. Powerport)	199.00
ThunderScan 4.0 Mac II Accessory Key ..	42.00



Word Finder (Microlytics) — Thesaurus DA with 220,000 synonyms. Automatic look-up and replacement. (spelling checkers) \$39

ACCESSORIES

Bantam	
Complete HyperCard Handbook (Goodman)	24.00
Bech Tech	
Fanny Mac	69.00
Curtis	
Ruby (6 outlets; filtered; 6 ft cord)	55.00
DataDesk	
HyperDialer	26.00
Ergotron	
MacTilt or MacTilt SE	68.00
Mouse Cleaner 360	15.00
Tilt/Swivel for Megascreeen	85.00
I/O Designs	
Imageware II Carrying Case	49.00
IW II Ribbons-Black or Color	5.00
Four Color Ribbon	12.00
Matrix Film Ribbon-Black or Color	8.00
Macinware Plus Carrying Case	69.00
Macinware SE Carrying Case	76.00
Ribbon for Seikosha - Black	6.00
Innovative Tech	
Easel Plus	14.00
Pocket Pak (holds 6 disks)	9.00
Speed Pad	12.00
Kalmar	
Rolltop Cabinet 45 Teak (45 disks)	14.00
Rolltop Cabinet 90 Teak (90 disks)	21.00
Rolltop Cabinet 135 Teak (135 disks)	27.00
Kensington	
ADB Keyboard Cable—Extra Long	28.00
Anti-Glare Filter	33.00
AppleTalk Clips—cables or connectors	1.00
Disk Drive Cleaning Kit	20.00
Imagewriter II Cover	9.00
Macintosh Plus or SE Dust Cover	9.00
Mac II Monitor Cable Extension Kit	35.00
Mac II Stand	21.00
Mouseway (mouse pad)	8.00
Printer Muffler 80	38.00
Printer Stand	17.00
Surge Suppressor	34.00
System Saver Mac (fan and more)	64.00
Tilt/Swivel	22.00
MacCable	
Modem Cables (various)	Call
Printer Cables (various)	Call
SCSI Cables (various)	Call
MacWarehouse	
Mouse Pad	7.00
Magnum	
Mouse Mover	14.00
Orange Micro	
Grappier Interface	69.00

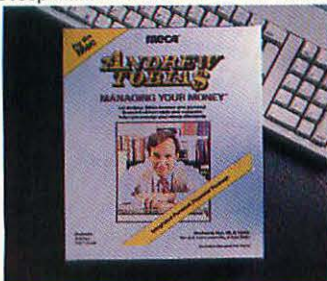
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MORE FOR YOUR MONEY...

Enzan-Hoshigumi	
MacCalligraphy	115.00
Great Wave	
Crystal Paint	41.00
MicroMaps	
MacAtlas Pro (MacDraw format)	129.00
Mindscapes	
GraphicWorks 1.1	84.00
Olduvai	
Post-Art	42.00
Silicon Beach	
Super Paint (super graphics)	79.00
Super 3D	195.00
Solutions	
Curator (graphics management)	79.00
SuperMac	
Pixel Paint	265.00
Symmetry	
Picture Base 1.2	59.00
T-Maker	
ClickArt Business Image	28.00
ClickArt Christian Images	31.00
ClickArt Effects or Holidays (ea.)	28.00
ClickArt EPS Illustrations	78.00
ClickArt Publications	28.00
Zedcor	
DeskPaint	39.00

DESKTOP PUBLISHING PRODUCTS

Adobe	
Illustrator 88	425.00
Aldus	
PageMaker 2.0	419.00
Letraset	
Image Studio	279.00
Ready-Set-Go 4	279.00
Olduvai	
Read-It! (optical character recognition)	159.00
Read-It! TS (ThunderScan version)	79.00
Solutions	
Super Glue (total graphics integration)	56.00
Target	
Scoop	199.00



Managing Your Money (MECA) — Master your personal finances: budgeting, check writing, net worth, and more... (finance) \$129

NETWORKING PRODUCTS

Farallon	
PhoneNET 128/512	44.00
PhoneNET Plus, SE & II	44.00
PhoneNET Appletalk Adapter	8.00
Microsoft	
Mail	Call
Nuovotech	
TurboNET 128/512	35.00
TurboNET Plus, SE & II	35.00



1st Merge/1st File (1st Desk Systems) — Easy-to-use relational database / Full-featured list manager with mail merge. \$59 each

TurboNET Apple Talk Adapter	5.00
TOPS	
TOPS	170.00
WOS Data Systems	
Timbuktu 1.0	Call

FONTS

Adobe	
Fonts (various volumes)	Call
Altsys	
Fontastic Plus	47.00
Fontographer 2.2 (laserwriter fonts)	239.00
Dubl-Click	
World Class Fonts - Both Volumes	45.00
Postcraft	
Laser FX	119.00

CAD/CAM

Challenger	
Mac3D 2.1 (3-D graphics)	126.00
Diehl Graphsoft	
MiniCad	365.00
Innovative Data	
MacDraft 1.2a (power drafting)	155.00
Micro CAD/CAM	
MGMStation (professional CAD)	685.00

FINANCIAL AND ACCOUNTING SOFTWARE

BPI	
Entry Series General Accounting	129.00
MECA	
Andrew Tobias' Managing Your Money	129.00
Migent	
In-House Accountant	109.00
Monogram	
Business Sense	282.00
Softsync	
Accountant, Inc	179.00
Softview	
MacInTax 87	65.00
MacInTax California Supplement 87	35.00
TaxView Planner	45.00
Survivor	
MacMoney (personal finance)	65.00

STATISTICAL ANALYSIS

Abacus Concepts	
StatView II (req. Mac II, or Plus/SE w/68881 co-processor)	369.00
BrainPower	
MathView Professional	149.00
StatView 512+ (requires 512k)	177.00

Cricket	
Statworks 1.2 (statistical package)	74.00
D2 Software	
MacSpin 1.1	155.00

MUSIC AND SOUND

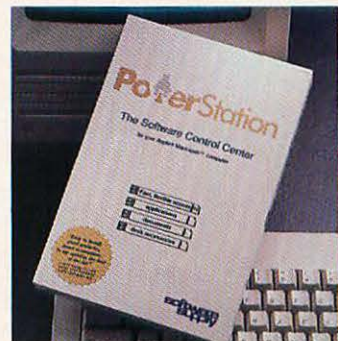
Bogas Productions	
Studio Session	52.00
Broderbund	
Jam Session	30.00
Cambridge Auto	
MIDI Conductor	49.00
Electronic Arts	
Deluxe Music Construction 2.0	61.00
Farallon Computing	
MacRecorder (records sound)	149.00
Great Wave	
ConcertWare + 4.0	39.00
ConcertWare + MIDI 4.0	79.00
Impulse	
Impulse Audio Digitizer w/SoundWave	149.00
Periscope Press	
Practica Musica	77.00
Resonate	
Listen 2.0	62.00

EDUCATIONAL/PERSONAL

Broderbund	
Sensei Physics	61.00
Davidson	
Math Blaster	27.00
Word Attack!	28.00
Electronic Arts	
Business Simulator (executive training)	48.00
First Byte	
Kid Talk, Math Talk ea	32.00
Great Wave	
Kids Time	26.00
Learning Company	
Reader Rabbit	34.00
Mindscapes	
Perfect Score S.A.T. (w/Perfect College)	47.00
Nolo Press	
Will Maker 2.0 (prepare your own will)	30.00
Palantir	
MacType	32.00

GAMES

Accolade	
Hardball	23.00
Activision	
Shanghai (strategy)	24.00



PowerStation (Software Supply) — Fast, easy access to applications, documents and DA's. Includes the screen-saver Pyrol (utilities) \$38

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- CT residents add 7.5% sales tax. NJ residents add 6.0% sales tax.
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*Defective software replaced immediately. Hardware replaced or repaired at our discretion.

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In the computer world there are probably 15 non-PostScript printers for every PostScript printer.

work. The printer manufacturers should be doing this work themselves. We don't have the programming staff to do it.

All of us with graphic arts applications are up against the wall in this—I don't want to do printer drivers, but I have an obligation to. There is another alternative: Apple should be doing the drivers. I had Apple in here last week. They agree.

What is the best output technology?

The film recorder. Film recorders are RGB-based—that's red, green, blue—and more flexible in their range of colors. Besides,

slides are the most professional presentation medium. For hard copy there are the new ink-jet and thermal printers. The thermal printers cost more than the ink-jet ones, but they offer better resolution and richer colors than the ink-jets. CalComp is going to switch to an RGB interface for its thermal printer.

Will it be a video screen dump like the process Seiko Instruments has been using for the last several years?

Yes. We'll work with the CalComp thermal printer and with the new Tektronix thermal printer that dithers colors to make up to 16 million available. While screen dumps are

not the way to create presentation slides—they only reproduce screen quality—our drivers take advantage of the maximum resolution of the printing device being used, just as PostScript does. Take our outline fonts, for example: I can show you output from an HP LaserJet using our outline fonts that rivals the quality of Adobe fonts.

Compare your font technology to Adobe's.

PostScript uses outline fonts, but Adobe fonts only work on PostScript printers. It's important to remember that in the computer world there are probably 15 non-PostScript printers for every PostScript printer.

Other than the QMS thermal printer that uses PostScript, there are no alternative printing technologies using PostScript. Don't get me wrong. I'm happy with PostScript, with the work Adobe did. It's a good job. But the whole world doesn't have PostScript.

(continues)

LIFE LINE.

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In theory, a PostScript clone can read a PostScript file, process the image, and produce it on paper.

Apple has taken a similar approach with its new line of printers—bitmap fonts at the low end of the line and PostScript at the top.

Yes, exactly. Apple still has PostScript, but the people there now recognize that there's another world out there and that high quality is possible on non-PostScript devices. The average user can barely tell the difference.

What are PostScript clones or PostScript emulators?

In theory, something that can read a PostScript file, process the image, and produce an image on paper that looks like the PostScript image. Actually the standard is not

that it should look like PostScript, but like output from a LaserWriter. Most people will use output from the LaserWriter to determine if the clone or emulator is properly implemented.

Adobe has its fonts locked up. What if I'm in Cricket Draw and want to rotate text in 3-D space? I need to run the font through a transformation matrix. But Adobe won't allow access to the character path information. It keeps font-path and font-data information secret. It doesn't want to allow other developers to access it, partly due to its agreement with Mergenthaler over fonts. Mergenthaler is very proprietary about its fonts.

But there is lots of other good font data available. We use URW [Unternehmensberatung Karow Rubow Weber GMBH] fonts. URW releases its font information to us: how to scale, rotate, and so on. They appear to work much like Adobe's fonts.

What's the down side of PostScript emulators?

They don't output like PostScript on the LaserWriter. They require different drivers—one for the thermal printer, one for the LaserWriter, and on and on. And there could be deviation from WYSIWYG. So it's important that they emulate PostScript closely.

So the emulators are going to recreate the chaos of the IBM PC world for Macintosh users?

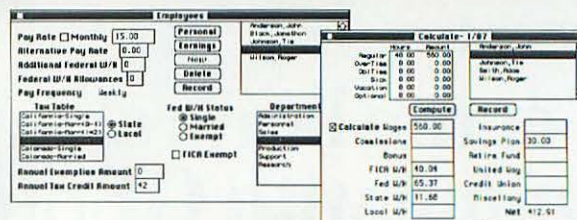
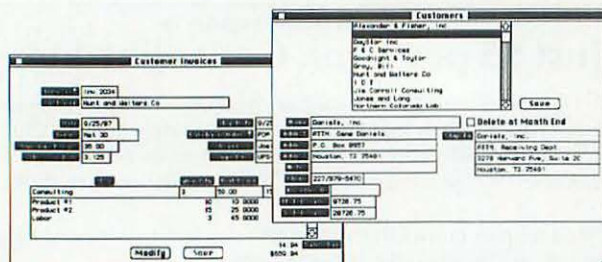
There is a very real potential for that. The real difficulty in emulating PostScript is emulating its bugs, such as the rounding errors that occur when PostScript rotates and moves text. It's common in the indus-

(continues)

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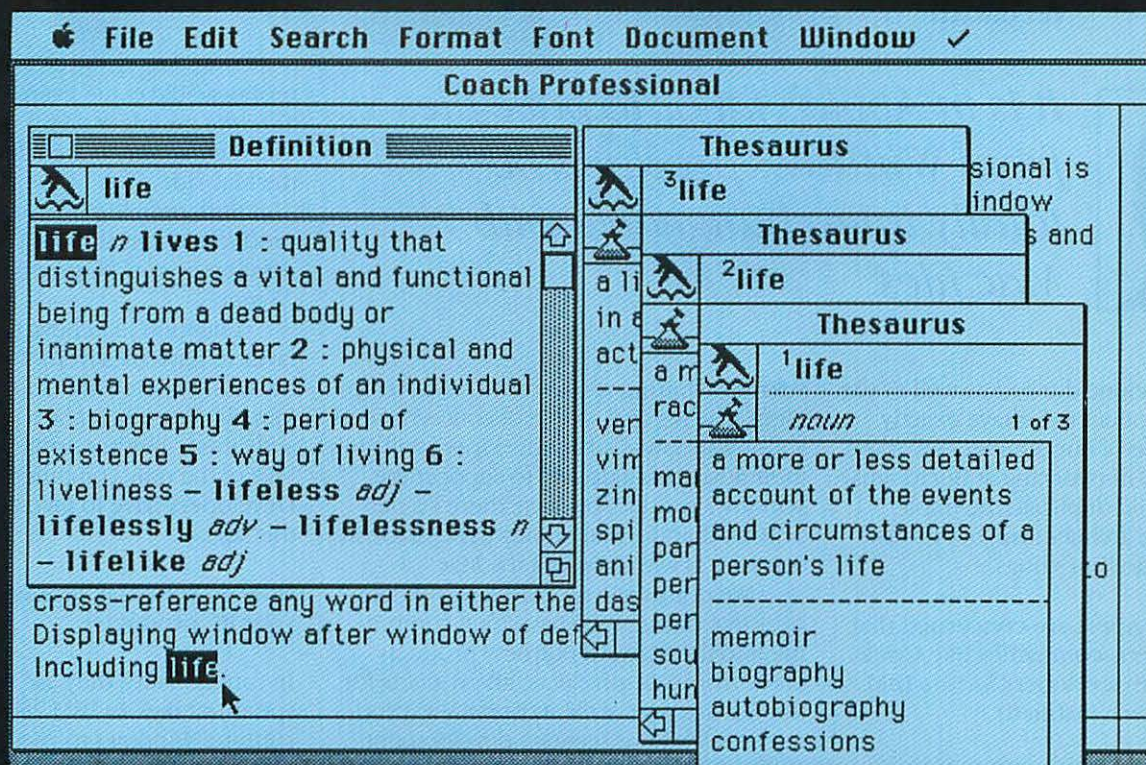
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It is in Apple's favor to have files from Windows products be totally interchangeable with Mac files.

try; you have to clone the bad as well as the good for one product to behave exactly like another. One of our engineers worked on emulating PC networking at Burroughs. He said they could duplicate the implementation of the architecture, but it was tough to duplicate IBM's bugs.

Many people at Apple are concerned that its key developers, companies like Cricket, have become developers for the IBM PC. Is that concern justified?

The concern is real and legitimate. We have never had any problems with Apple about that, though. There are two sources for their worry. The first is the fear that Mac product development will slip due to de-

velopers shifting resources to PC development. The second source of concern is about Windows—that developers will shift their advertising dollars to support the Windows product because there's a perception that the real money to be made in software is with IBM, not the Mac.

We don't have problems with Apple over that because we have total commitment to the Mac. All our new products come from Mac products, all products for the PCs are part of the existing Mac product line. We have separate development staffs, and we keep our advertising dollars on Mac products. I believe that graphics software developers will have greater success in the Mac market than with the PC.

Apple's concerns are based in part on companies such as Aldus, which last year implied that by the end of 1987 most of its

profits would come from its PC products. Now the people at Aldus wake up and see that the majority of its sales still come from the Mac side.

Still, people at Apple ask us, "Is your product slow in shipping because of your development of PC products?" We say, "Never."

I happen to believe that it is in Apple's favor to have files from Windows products be totally interchangeable with Mac files. John Sculley has made a point of saying exactly this—neither Apple nor IBM can say "We're the only computer in the world." Developers have to give users flexibility of this sort.

How do your Mac products compare to your PC products?

In functionality, they are the same. In speed, it takes an IBM 286 or 386 machine running Windows to rival the speed of the Mac. Keep in mind that Windows was designed to solve the inherent problems of the DOS environment, but the Mac was de-

(continues)

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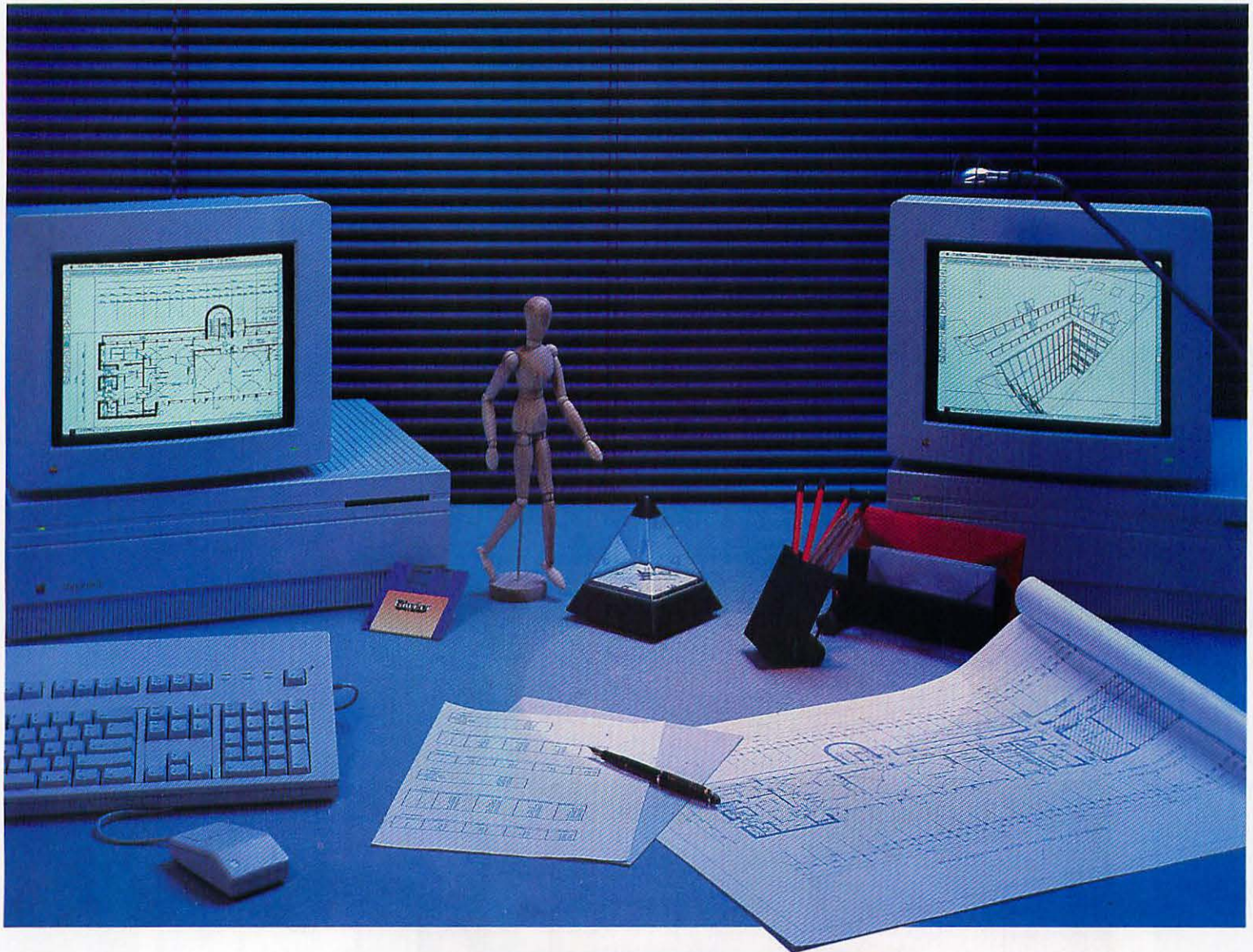
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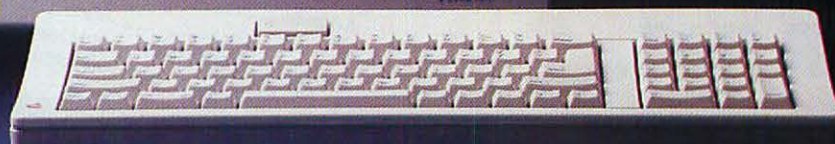
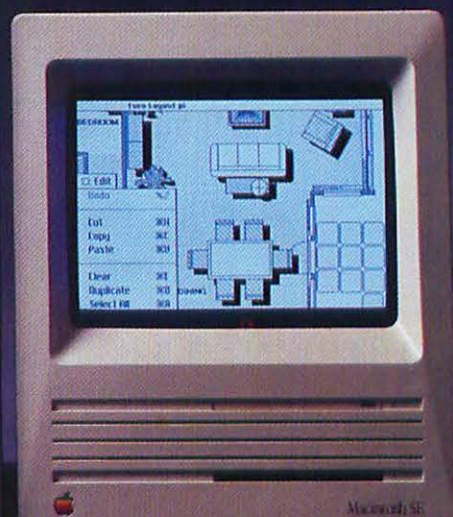
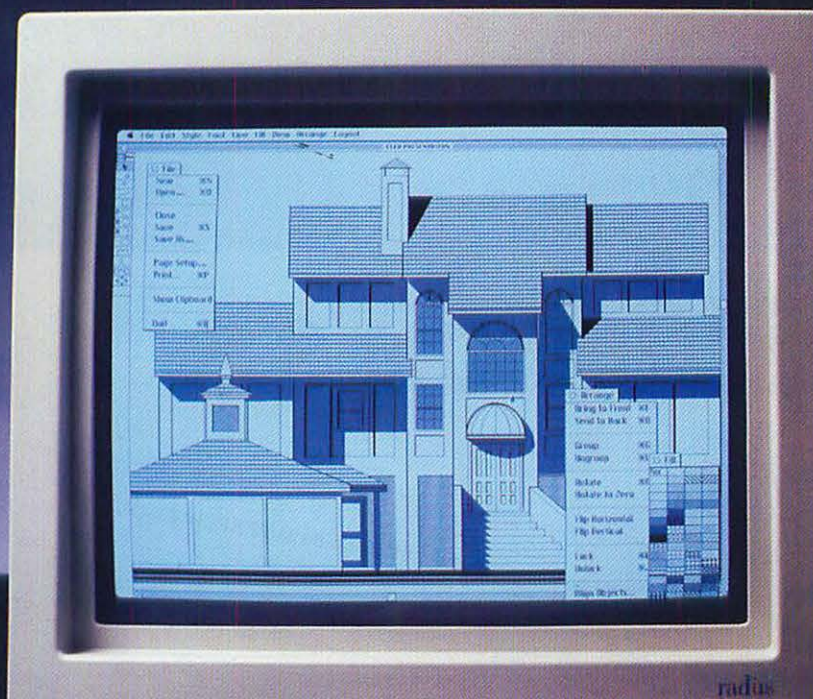
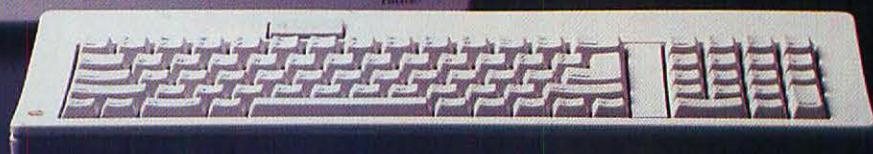
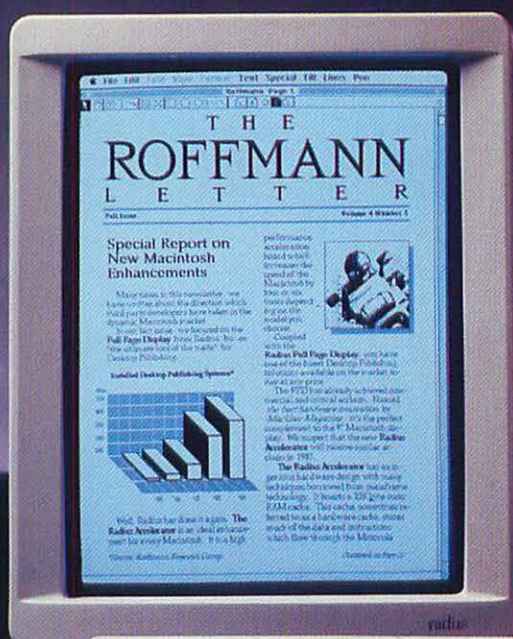
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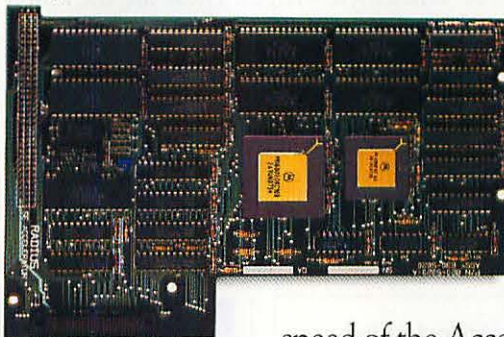
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I dream of one product with data-drive graphics, image processing, paint, draw, and page-layout capability.

signed from the ground up. There are tens of thousands of minor details in the Mac interface that were all worked out long ago. A lot of attention to details. Also, Windows is trying to ensure that all mouse operations have a keyboard equivalent. I think that compromises the interface.

If you could develop the product of your dreams, what would it be?

A total graphics environment. One product with data-driven graphics, image processing, paint, draw, and page-layout capability. Actually, in those terms such a product is quite possible, but few computers are capable of running it today. A Mac II with a

large screen, color, lots of memory...it's not really practical yet.

What is the most needed Macintosh improvement today?

DMA—direct memory access so that the input and output of data from the CPU can be faster. DMA would allow large amounts of data to be moved faster. Look at some of the applications today—we're looking at 4- or 5-megabyte images. These are the kinds of things that people will want to transfer between machines soon. They're memory-intensive. Color and high resolution chew up memory. The new math coprocessor from Motorola will have two to four times the speed of the current chip. For graphics processing we need to implement parallel

processing. We need about a 10-MIPS (million instructions per second) machine to support high-speed graphics.

If you were setting up a small business today with a Macintosh, what hardware and software would you choose (not including your own)?

A Mac II, an Apple color monitor, a hard disk with a minimum of 40MB, a minimum of 2MB to 5MB of RAM—5MB would be better. AppleTalk, a LaserWriter Plus, a scanner of some sort. I would buy an HP ScanJet for gray-scale input at 300 dots per inch.

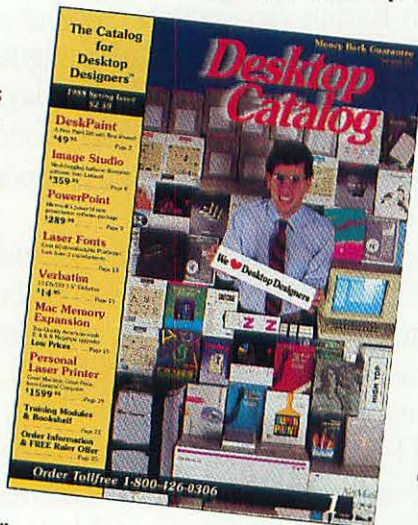
Probably a desktop publishing package, too—probably both PageMaker and Quark XPress. And a good word processor like Word or WriteNow, depending upon the nature of the work I would be doing. For a spreadsheet, Excel, definitely. A paint program like SuperPaint, a draw program like MacDraw, and a business graphics program.

(continues)

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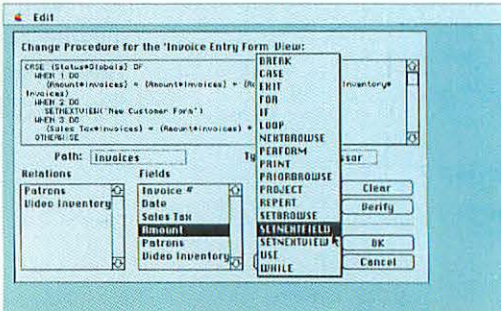
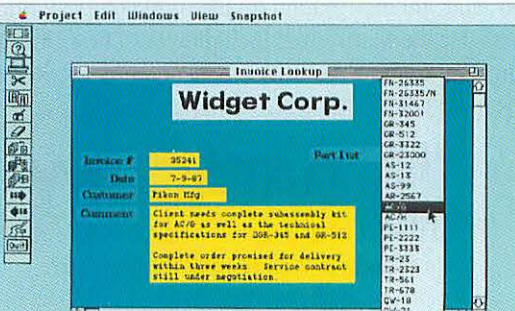
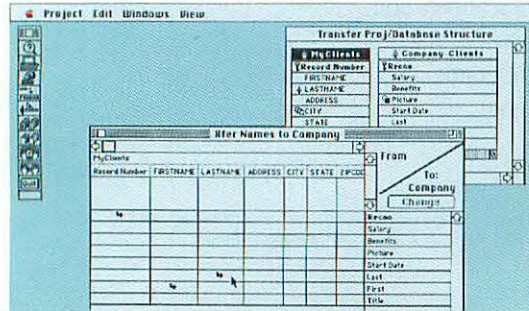
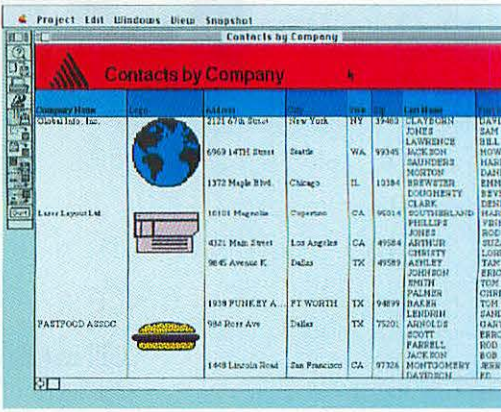
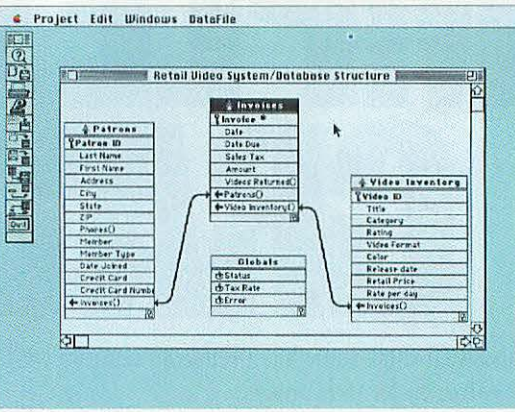
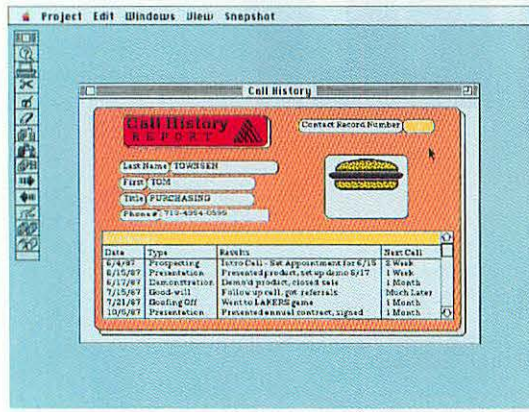
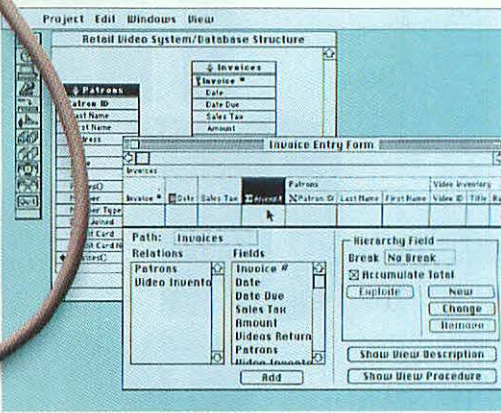
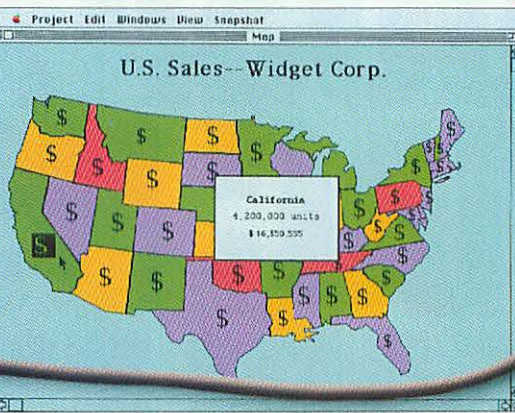
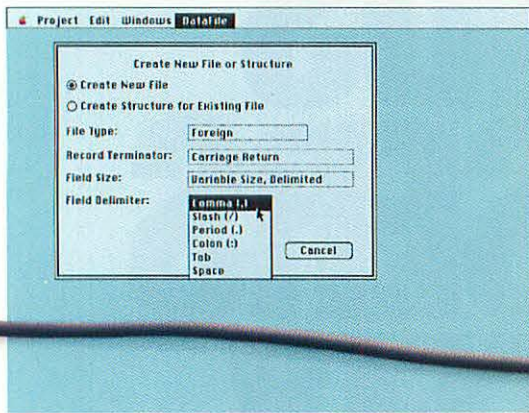
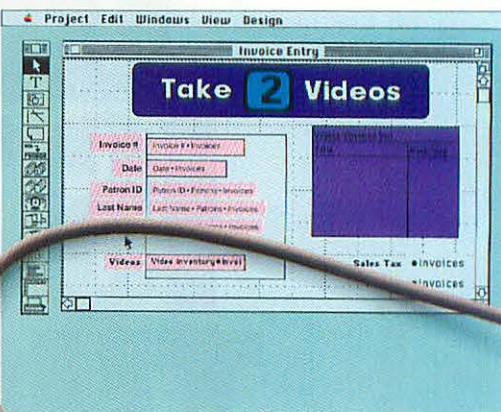
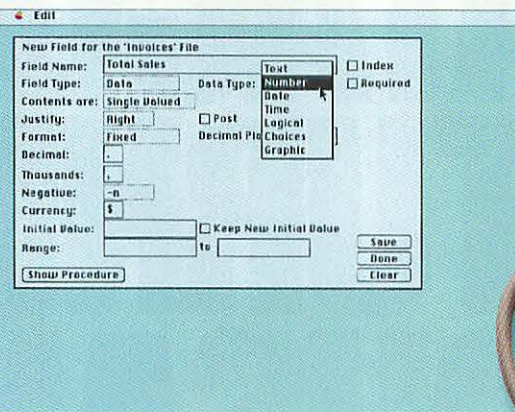
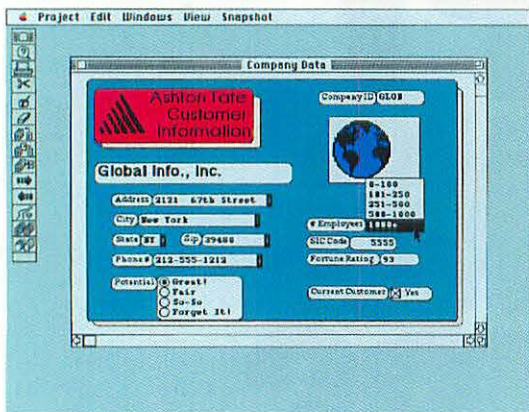
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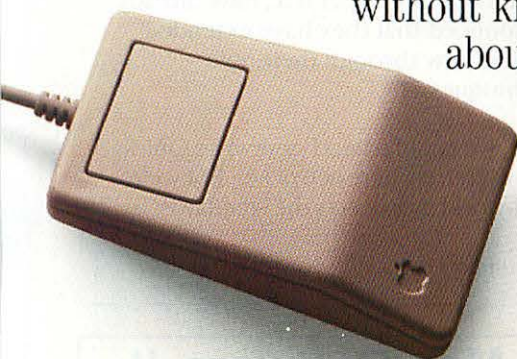


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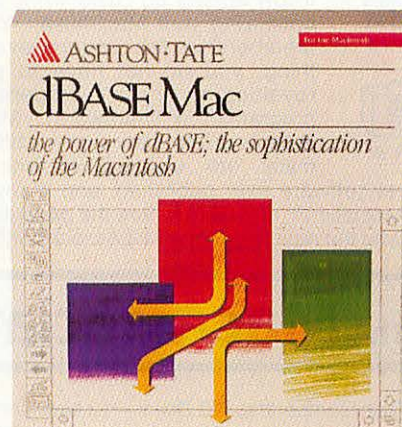
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Many companies preannounce products for the sole purpose of killing competition.

Which one?

Well, there aren't any out there but ours. And a database manager like Omnis 3 that is years old, tried and true. But I would look at 4th Dimension.

Are there any particularly disastrous products out there?

If I had to pick any disaster, I'd say FullWrite, because of its premature announcement.

Any comments on the ever-growing vaporware problem in the Mac market?

Some of the problems are intentional; some aren't. We slip in product development; Apple slips; other companies slip. But

it's very bad if you announce a product and haven't even started development yet. Back to FullWrite, for example. That was bad—to demo a prototype not far along in development.

Some of our products have been two to three months late. Also, it costs hundreds of thousands of dollars in advertising costs if a product doesn't ship. So it's the last thing we want to have happen.

Many companies preannounce products for the sole purpose of killing competition. Take the competition between Lotus and Microsoft, for example—to keep Excel sales low, Lotus preannounced by one year its spreadsheet product with a graphics interface.

PageMaker was two months late on the Mac. You can't fault things like that, because things come up that you don't expect. The flip side is what Microsoft did with Word 3.0. You can decide to meet a deadline and end up with a bad product. I would rather be late and take the flack.

Now that color for the Mac II is being extended beyond 8 bits, problems with QuickDraw are being reported.

I haven't tested this, but I think that QuickDraw actually only works up to 16 bits. Apple will work on it, but it will take a major repair of the firmware. Apple probably won't change the ROM on Mac IIs, so it will have to ship ROM patches on System disks.

Some third parties, such as Jasmine/RasterOps and SuperMac, have already announced that they have extended QuickDraw through their own techniques.

Well, we could extend or rewrite QuickDraw entirely here at Cricket. But we're real-world. Apple sets the standards. We

(continues)

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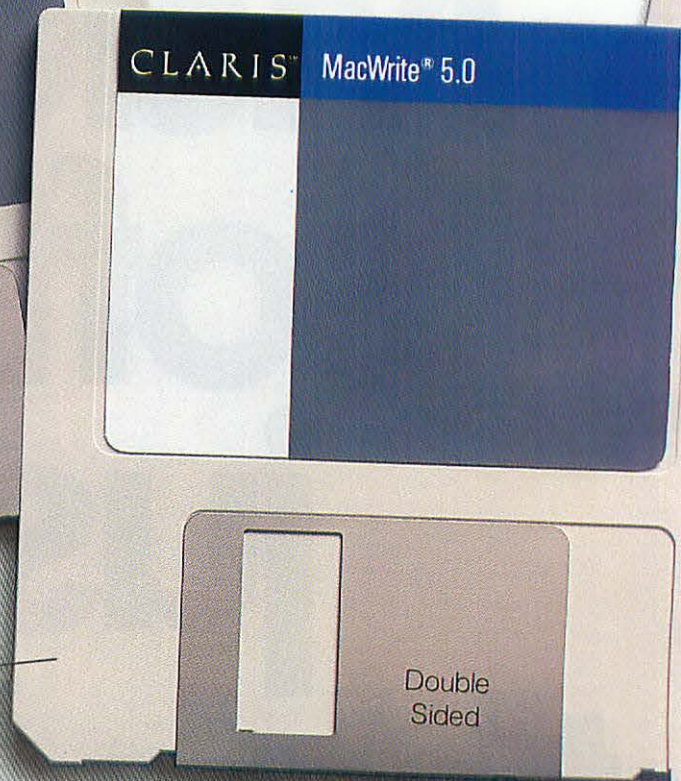
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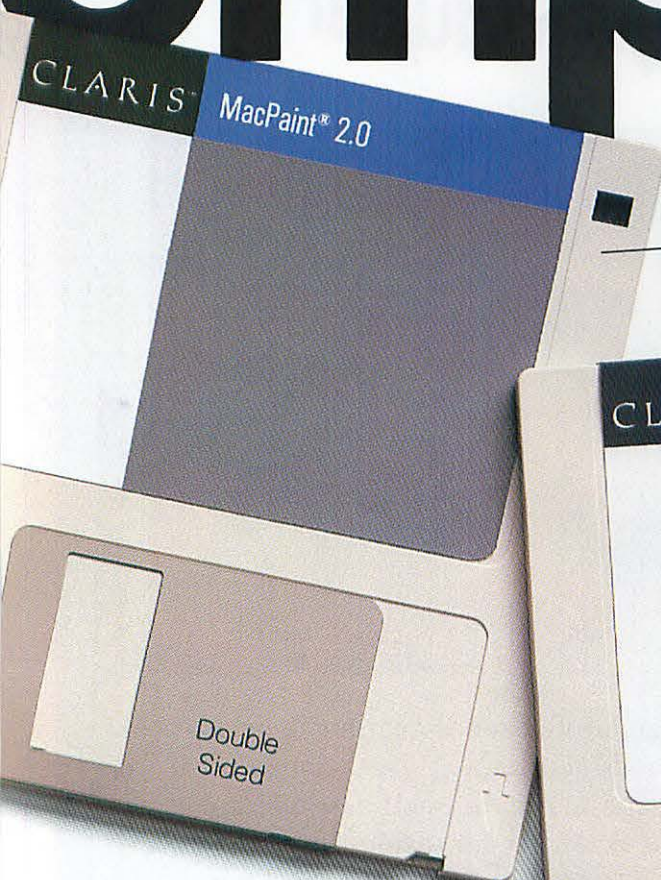
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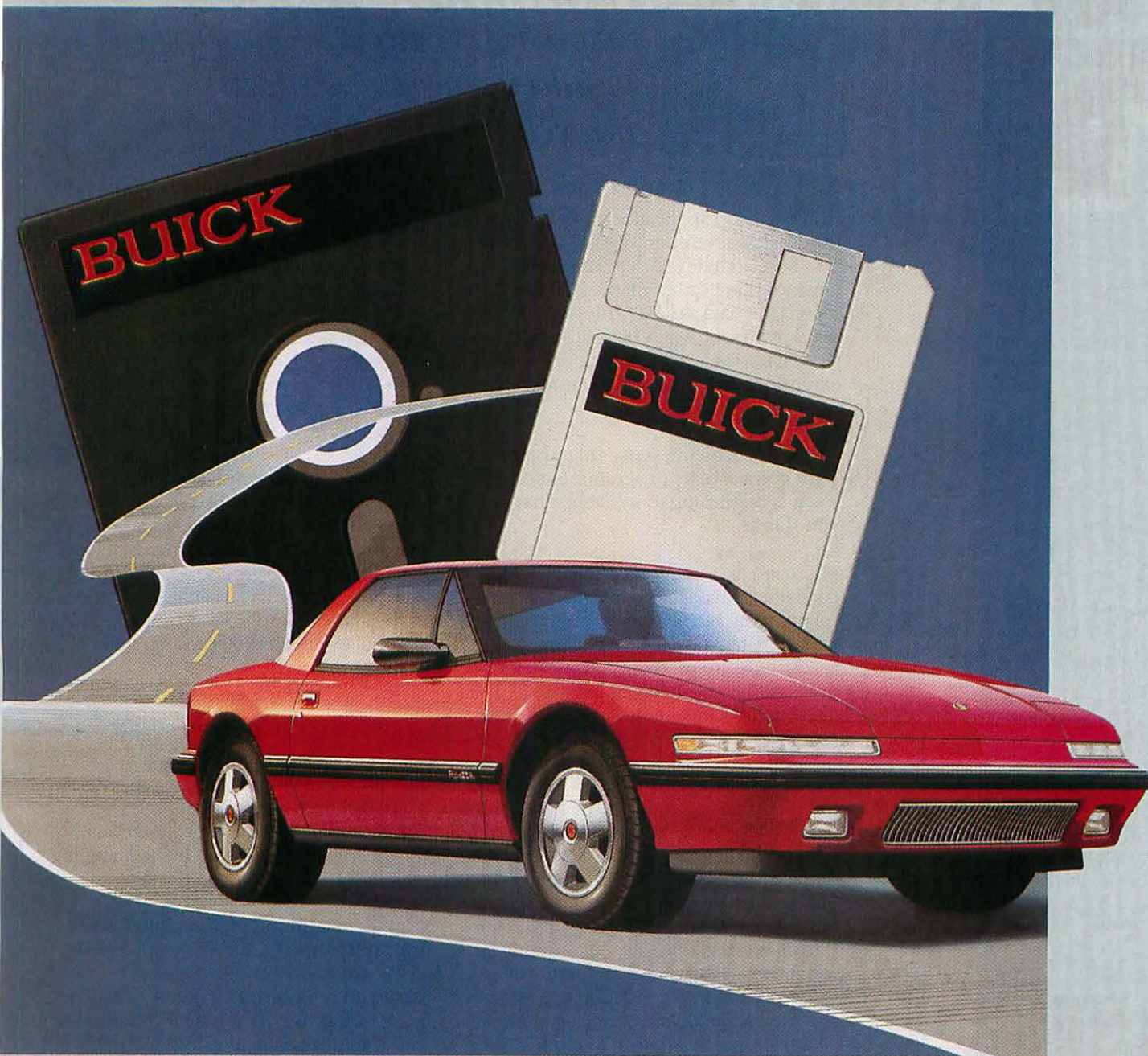
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I'm leery of putting QuickDraw extensions into a program that would compromise data interchange.

won't develop applications based on other third-party developers' work.

Sure, as a developer I can use any extensions that I can think up. But can I then record the data as a PICT file? Can I paste the drawing into the Clipboard and then paste it into MacWrite? I'm leery of putting extensions into a program that would compromise data interchange.

There is a growing sense that Apple's tight control of its programming environment is beginning to weaken; what do you think?

There are two examples of industry-standard file formats that Apple has had little or no input on: EPS [encapsulated PostScript] and TIFF [tagged-image file format]. Already there are problems. EPS files have holes, and the format was unneeded. It also conflicts in some areas with QuickDraw. TIFF is an Aldus-instigated file structure for imaging. It is so flexible that it has almost no limits. But everyone who knows the specifications of the format interprets them in a different way. So all of the scanner companies have different TIFF formats. To be able to read files in all of these different formats, my programs would have to have about 400K of code. It's simply too flexible. It's a classic case of overengineering. TIFF would be good if there were three variations: color, black-and-white, and gray-scale. But no company or organization should be allowed to modify or extend the format as it wants. For those of us developing programs, trying to read TIFF files has become a real problem.

Adobe has announced that it will extend PostScript to act as a display language for the Mac II. Any comments?

Let's ask whether this should be done, and not whether we want to see PostScript as a display language. Now PostScript is a LaserWriter driver; it's slow and not suited to interactive graphics. So if you develop PostScript to run as a screen driver, if it is

entirely rewritten to make it faster and to give it this capability, is it still PostScript?

If Apple doesn't endorse it on the Mac, it's not an important question for me anyway. If Apple won't support PostScript in its imaging model, I won't use it.

John Sculley, at a recent financial analysts' meeting, suggested that Apple is preparing to rewrite the Mac operating system.

Everyone knew that Apple would have to do this. The Mac OS is like all other operating systems. It would be like us admitting that at some point we had to rewrite Cricket Graph from the ground up. We couldn't fix it anymore. Yes, you can make changes in the Mac OS graphics, and that's important, but eventually you can't take care of all of the problems.

What are the implications for the end user?

I'll quote Jean-Louis Gassée on that. The users should see no difference. It won't affect them. It will have a new functionality that they will learn to use, but from their viewpoint, no difference.

And the likelihood of Mac clones, from your perspective?

Based on prior history, I doubt it. It all depends upon use of the Mac ROM routines, and if another company does use them, Apple's legal department will be there to take care of it. Apple has copyrights and patents on different aspects of the ROM.

There will truly be a clone only if some big company makes an agreement with Apple about the ROM. Sharp has a computer in Japan that has some of the Mac interface features—Trash Can, windows, and so on—but it won't run Mac software. □

Interviewed by Jerry Borrell

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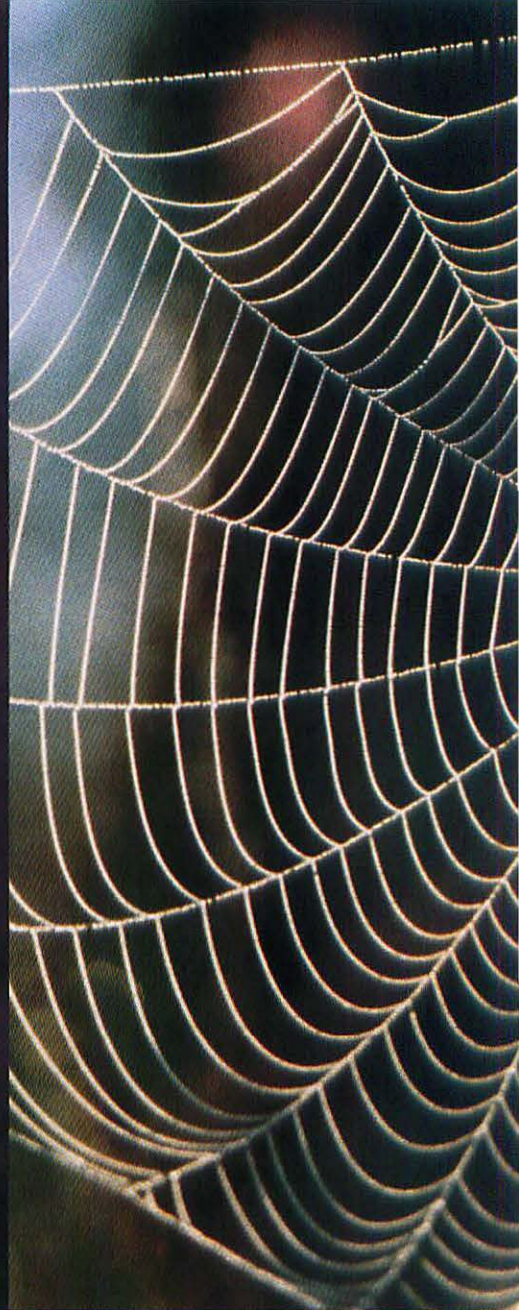
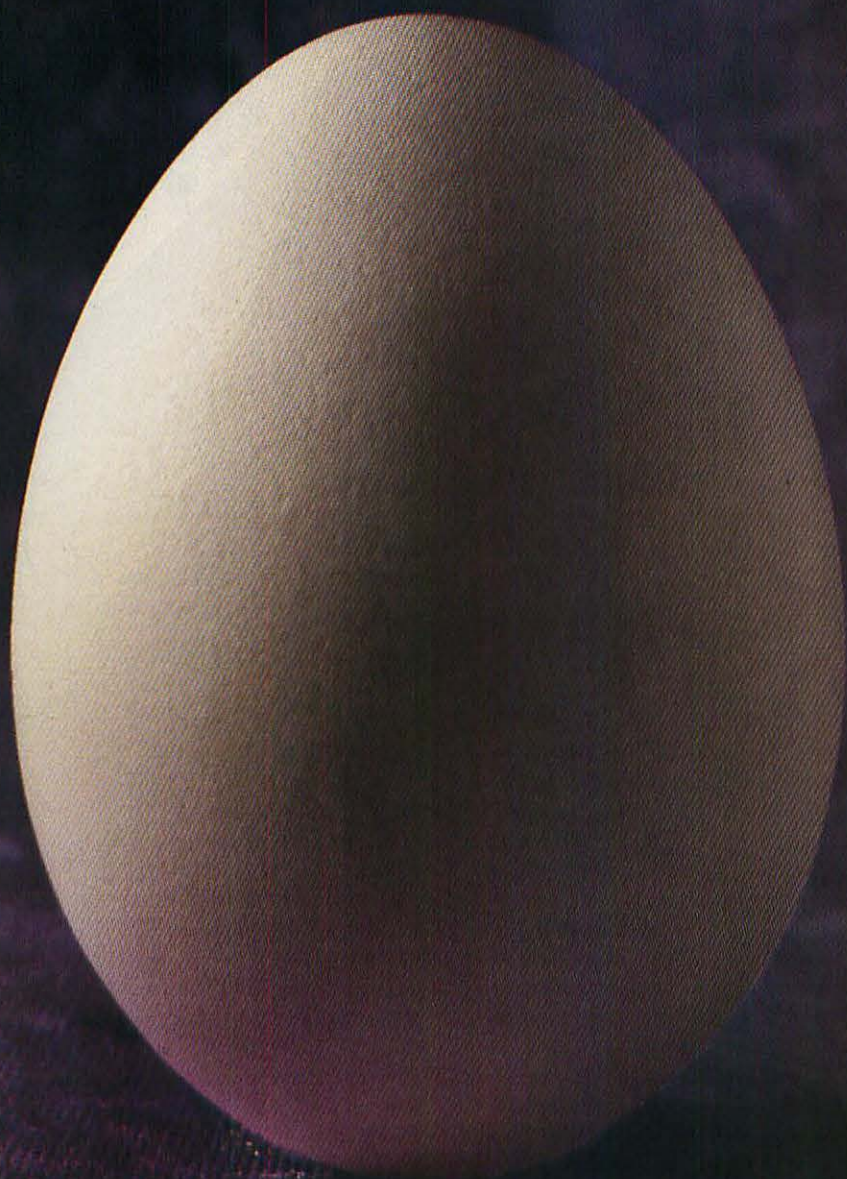
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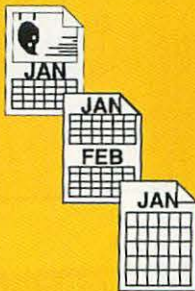
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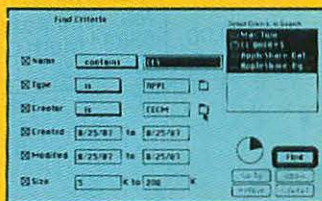
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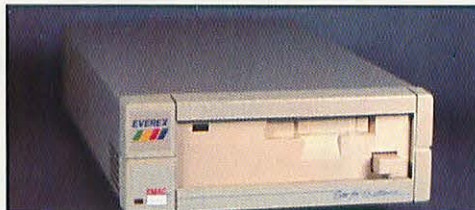
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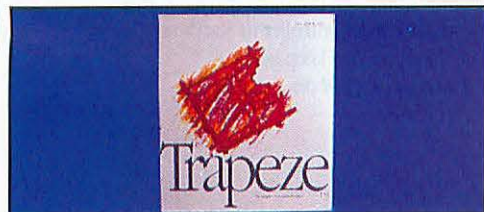


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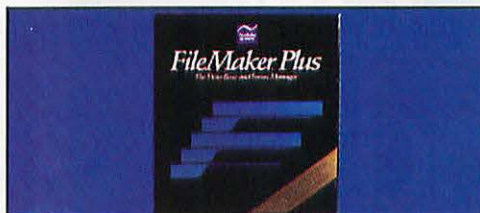
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Macworld News

by Gil Davis

Color SE

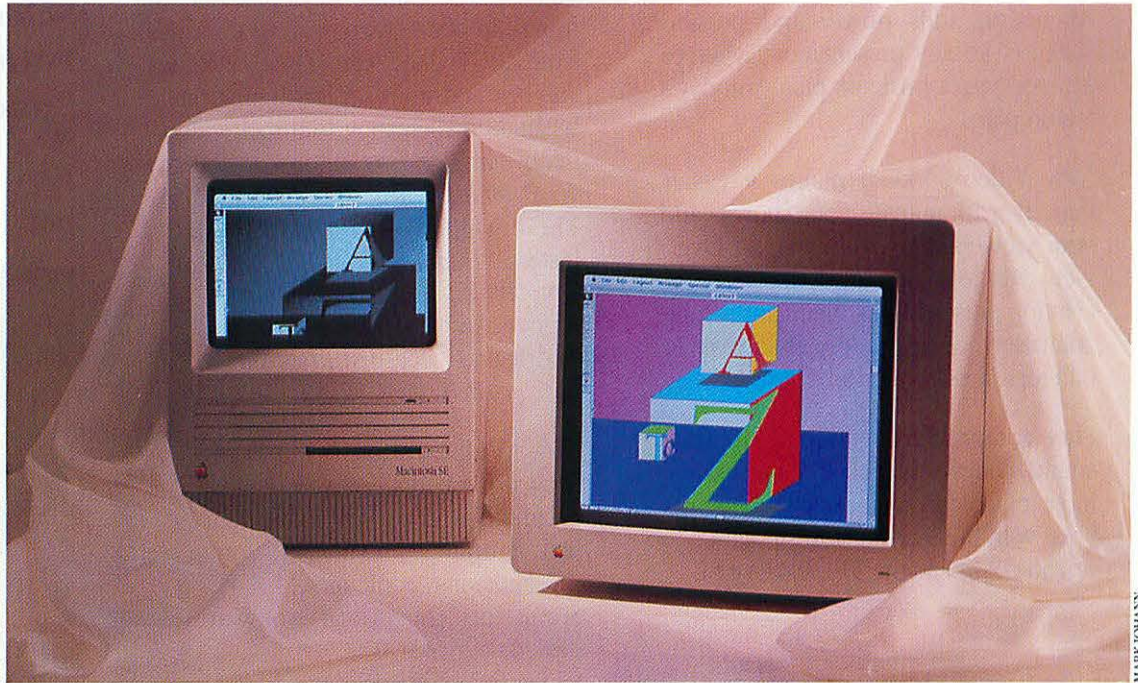


Hurray, a color Mac SE is here...but not from Apple. Instead, Orchid Technology is offering a ColorVue video card that plugs into the SE's expansion slot. Attach a standard color multisync monitor, insert a color program, and voilà...your SE is colorized.

But instead of the Mac II's 256 colors, the ColorVue card can manage only 16 colors. That doesn't mean it isn't highly useful; it's compatible with all software that can print color on the ImageWriter II and the LQ—including Cricket Draw, Cricket Graph, Cricket Presents, More, Quark XPress, Canvas, MacDraw 2.0, Modern Artist, Videoworks, and SuperPaint. It also allows printing in color with Hewlett-Packard's Paint Jet.

ColorVue's list price is \$695, about the same as the Apple-Color video board for the Mac II with expanded video memory. Within a few months, says Orchid, both its board and a multisync monitor should be available for less than \$1000.

Price will be important to ColorVue's future because customers will be comparing it with a Mac II color monitor. In comparison to the SE, the ColorVue's screen drawing is slow because it must refresh the screen in three separate passes, one for red, one for green, and one for blue. In monochrome mode, the screen-refresh rate on the auxiliary monitor is about the same as the SE's own screen's.



Color comes to the Macintosh SE, with a ColorVue video card from Orchid Technology that allows the SE to display up to 16 different hues simultaneously.

Planned upgrades include simultaneous utilization of both screens (currently, using the color screen precludes working on the Mac screen), speeding up the screen redraw with a Motorola 68020 processor, and supporting monitors of up to 1024 by 768 pixels.

The implications of this product may be as important as the product itself. Orchid Technology claims to have been communicating with Apple throughout development, and Apple reportedly has indicated that there will be a window for Orchid's product throughout 1988. From this, one might assume that Apple will not re-

lease a less-expensive color Mac this year, neither a color version of the Mac SE nor a smaller version of the Mac II.
—Scott Beamer

Color's Missing Link



Despite all the recent talk of desktop presentations, it's been impossible to get high-resolution color slides without compromising convenience, cost, or compatibility. Until recently, you had to spend over \$10,000

for a film recorder or rely on an outside production service.

One film recorder, the ImageMaker from Presentation Technologies, provides fairly high resolution for around \$5000, but it can't use all the Mac's fonts or make slides with complex graphics. The Film Printer, a new 16-pound film recorder from Mirus, makes high-resolution color slides from Mac images for under \$6000. Mirus has been able to keep this price down by using a custom design for most of its components.

The Film Printer produces color slides with up to 8000-

(continues)

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(You can also use VideoWorks II for your *nonanimated* slide shows.)

The original VideoWorks made history. (*MacUser* called it "the most innovative program of the year."

Disney Animator Frank Thomas said it was, "the best program I ever used.")

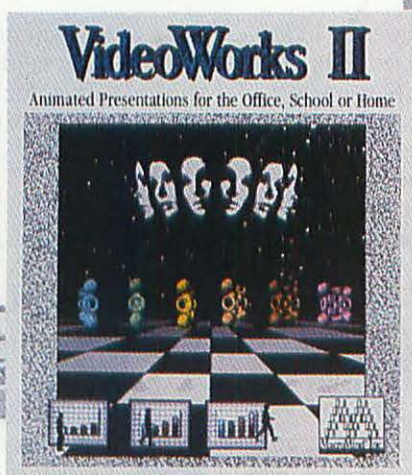
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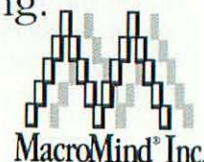


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Color images created or edited on a Mac II can now be rendered beautifully as slides.

line resolution from any program that can create a file in PICT format, and reproduces any fonts and graphics other than those stored as PostScript files. It also produces slides with a wide range of color gradations, accepting images from a Mac II with up to 24-bit color graphics.

Users create slides by first taking a screen shot within an application, probably by using a desk accessory, and then quitting the application to generate a film print with utility software. A local color-film processing lab can then produce color prints. The film recorder is set up for Ektachrome 100 film but also provides look-up tables that can be configured for different film types. For more information, call Mirus at 415/949-5544.—Adrian Mello

HYPERCARD

Video Voyages via HyperCard



Using *The National Gallery of Art Laserguide*, HyperCard, and a videodisk player, you can view more than 1500 works of art in the National Gallery of Art's permanent collection. Your ability to take notes in HyperCard and to search for a certain artist or period using a built-in subject index of over 1000 terms enhances your tour.

You can even combine key words, thus narrowing your selection to a category such as French Impressionist landscapes.

Although the information included in Voyager Company's *Laserguide* is valuable, many users will find the guide's forte is customization. As with any HyperCard stack, you can add your own notes—including key words—to any card, making *Laserguide* easily configurable by teachers. This capability extends beyond the videodisk that contains the National Gallery of Art's permanent collection to thousands of videodisks sitting on shelves in schools, homes, and libraries, making HyperCard a potentially powerful publishing medium in the computer world.

Once Voyager developed a way to "tour" its 40 laser



Create your own exciting tours using this HyperCard control panel for a videodisk player.

disks—ranging from movie classics to educational videos to an anthology of computer graphics—it decided to give even more power to the user through "interactive video." At this technology's most basic level, the disks are produced in a way that lets viewers use the freeze-frame and slow-motion options of their videodisk players, allowing close analysis of selected scenes.

But to make the most of interactive video, Voyager developed the Voyager Videostack, a HyperCard "toolkit" that contains ready-made buttons to control videodisk functions such as Play, Stop, Step, Fast Forward, and Frame Search. The

stack's Event Maker lets you combine events (for example, play until frame 300 with audio 1 only) and make them into HyperCard buttons. Scripts for all buttons and commands are available to the user to facilitate programming. A Slide Tray module lets you make a list of frames and their descriptions and then play them back for presentations.

The National Gallery of Art Laserguide sells for \$49.95 (plus \$95 for the videodisk). Voyager will offer additional disks later this year, including a guide to the works of Vincent van Gogh and a complete index to Bio Sci, an educational disk that contains over 6000 images. The Voyager Videostack (software for creating tours with your own videodisks) also sells for \$49.95; a Mac Plus, SE, or II and a videodisk player with an RS-232C interface is required. Voyager even sells cables to connect the Mac to a number of videodisk players. For further information, contact The Voyager Company, 2139 Manning Ave., Los Angeles, CA 90025, 213/475-3524.

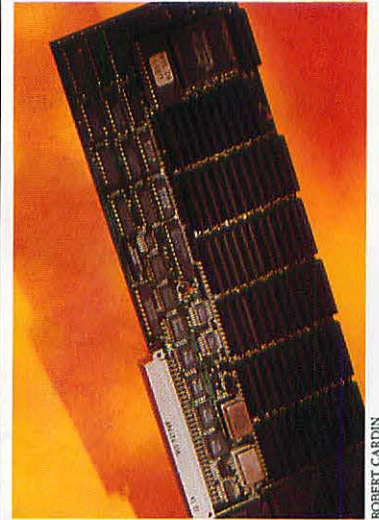
The Mac II Mix-and-Match Game



At least 15 mostly multisync color monitors were declared Mac II-compatible last year. They all claimed compatibility with a variety of computers and video cards because they could work with the AppleColor video card. Surprisingly, no third-party developers introduced cards offering access to resolutions higher than the 640 by 480 pixels supported by the AppleColor card.

This year, several vendors

have already come forward to remedy that, so the Mac II community can start looking for the best combination of price and performance between cards. Here's a sampling of what's available.



RasterOps's color card drives many monitors—choosing a combination is still complex.

E-Machines has two new color cards and two color monitors for the Mac II. Its Color-Plus II video card is intended as a low-cost alternative to the Apple card. Working in 1-, 4-, or 8-bit modes, at 832 by 624 pixels, it will offer twice the screen information of the Apple card. That's enough to display an 8½-by-11-inch page in landscape mode on a 13-inch monitor.

SuperMac is offering a 24-bit Spectrum color card for \$2995 that will drive SuperMac color monitors at up to 1024-by-768-pixel resolution. At \$745, a SuperMac Color Card is higher in price than Apple's \$499 card. However, both include SuperMac's PixelPaint software, which lists for \$495.

RasterOps, after introducing the first Mac II 24-bit color card last fall, has announced an 8-bit color card. It will require a monitor that has a refresh rate

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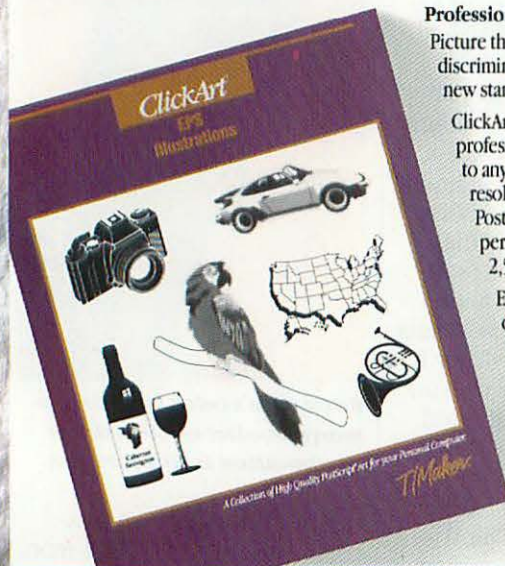
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Macintosh and IBM PC versions: \$129.95. Must be used with applications that read Encapsulated PostScript and printers that output PostScript.



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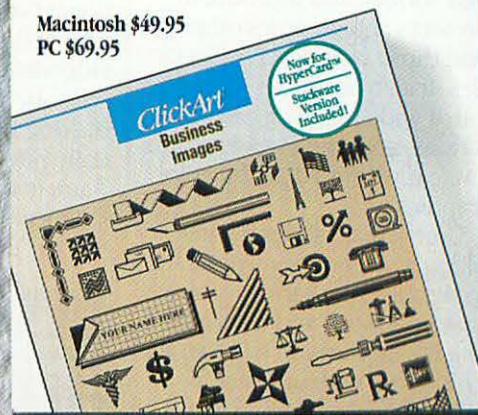
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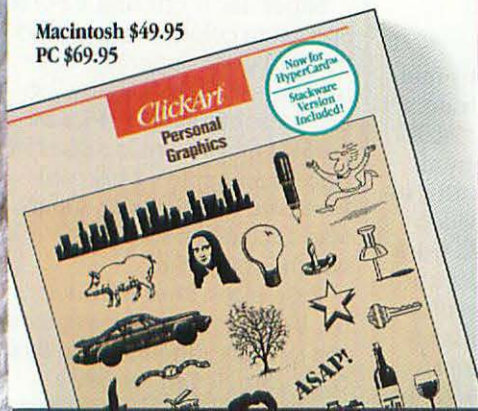
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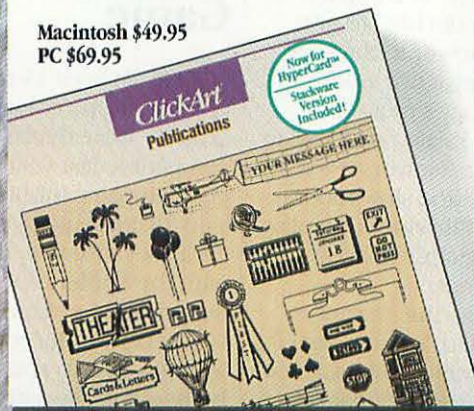
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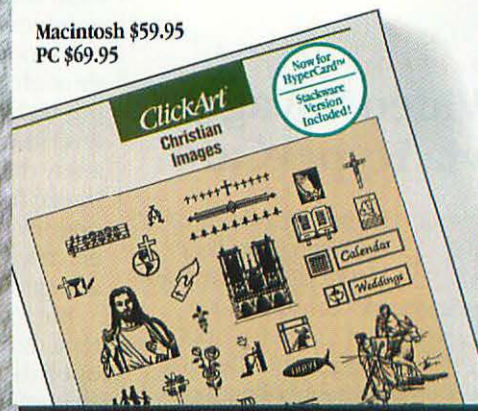
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of at least 64 Hz. Its resolution will be the same as the 1280-by-1024-pixel, 24-bit video card, providing a 19-inch monitor with over 90 dots per inch (the AppleColor monitor has a resolution of 69 dpi). Few multisync monitors will support such a high resolution.

Megagraphics has an 8-bit video card that, when bundled with a new 1024-by-900 resolution, 19-inch color monitor, is priced around \$5000. The card has an 80-Hz clock rate and 80-kHz refresh rate.

Taxan will be offering a low-end multisync monitor that will work with the AppleColor card. Taxan's 19-inch color monitor works with its own card—the combination will cost about \$4500. The monitor will feature dynamic beam focusing, a technique that will eliminate the fuzziness so often found in the corners of third-party monitors.—*Scott Beamer*

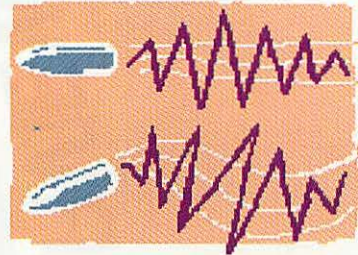
Extending the Long Arm of the Law



Thanks to GW Instruments, the Mac II is providing law enforcement agencies with low-cost,

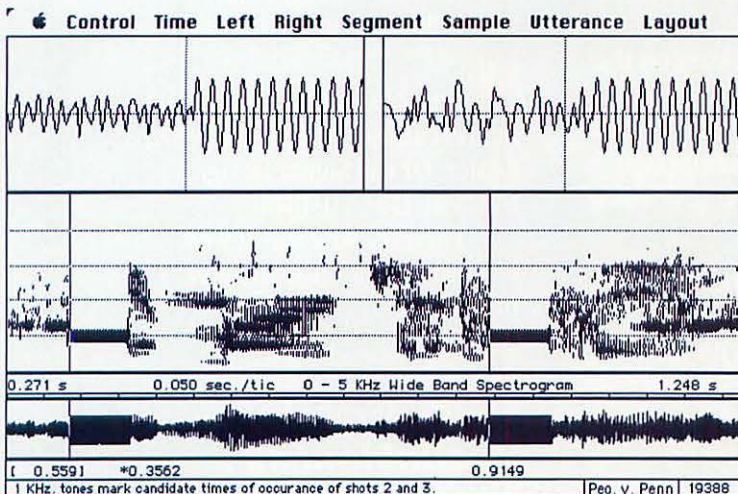
easy-to-use analysis of recorded speech and sounds.

In a recent trial in San Diego, Mac Speech Lab II was used to analyze gunshots recorded over the 911 emergency line so a jury could determine if the shots were fired by the defendant deliberately or haphazardly. Partly because of the sound analysis, the defendant was found not guilty.



ardly. Partly because of the sound analysis, the defendant was found not guilty.

Adding the power of the Mac II to MacSpeech Lab has considerably extended the capabilities of speech analysis on a microcomputer. Finer details of speech can now be recorded for analysis. Using a MacADIOS II data acquisition board connected to the NuBus, Mac Speech Lab II extends the upper end of speech sampling from 20 kHz to 80 kHz. The system also makes it easier to view the analyses, because the sound spectrograms can now be displayed at a higher resolution by using the gray scales of the Mac II monitor—and the screens can be printed on a LaserWriter.



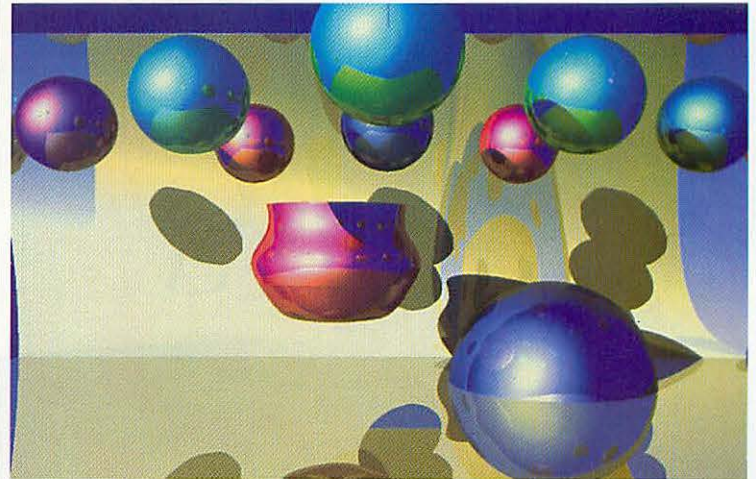
GW Instruments' MacSpeech Lab II digitally records and analyzes complicated sounds using sophisticated tools.

Eventually, the work being done with MacSpeech Lab II on speaker-independent speech analysis (using a technique known as Linear Predictive Coefficients) may provide the Mac with a way to recognize any spoken command. The talking Mac has been here awhile; can the listening Mac be far away?

For further information, contact GW Instruments in Cambridge, Massachusetts, at 617/625-4096.—*David R. Kosiur*

Design Dimensions is a 3-D, wire-frame, free-form drafting program that displays curved surfaces. Its files can be passed on to Solid Dimensions, which smooths the edges of the designs and colors all planes with reference to a particular light source. Screen images can be saved in resolutions from 640 by 480 to over 4000 by 4000 pixels.

Ray Trace Dimensions permits a surface to be broken



These forms aren't real. The image was produced on a Mac II with Visual Information's Ray Trace Dimensions, which uses millions of calculations to show how light would fall on objects.

Animation, CAD, and 24-Bit Color

Visual Information is currently shipping four computer-aided-design software packages—the first commercial software for the Mac II that supports its entire 16.8-million-color palette at one time. These are the only commercially available applications that can take advantage of a 24-bit color video card. (All other Mac II video cards support only 8 bits per pixel of color information, limiting software to a screen display of 256 colors at one time.) Expect to see stunningly realistic color animations with the potential to equal any graphic effects seen on TV.

down into individual pixels, each having its own 24-bit color value. This allows high-quality solid modeling with finely shaded color comparable to anything produced by other modeling packages. Reportedly, this program has already duplicated designs produced by VAX computers, without any degradation of image.

Animation Tool Kit takes frames from Solid Dimensions and runs animation sequences. It can also draw the frames between a beginning and an ending frame, which is called "in betweenning." Using such tools, an architect can produce a 3-D building model and then lead clients on an animated "walk-through."

(continues)

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S I G M A D E S I G N S

Another use for Design Dimensions would be for passing a Solid Dimensions model to MacNeal-Schwendler's finite-element analysis program, MSC/pal, which can place theoretical stresses and twists on the model. The model surface will show differential coloration to represent stress variables. The design can then be modified and retested for stress, before it's passed it on to machining programs. For more information, call Visual Information in La Puente, California, at 818/918-8834.—*Scott Beamer*

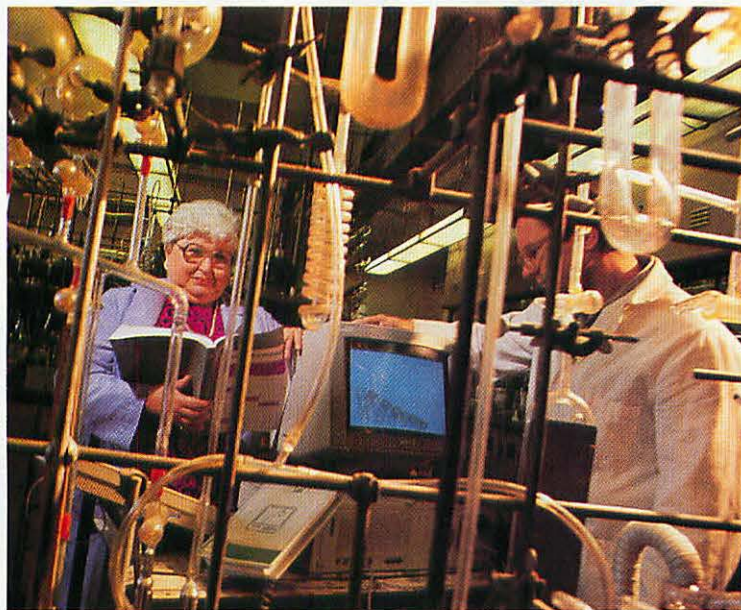
Beyond CAD with Simulation



Simulation is a large part of high-level engineering computation, and now the simulation program Simul 1.3, developed by a team of Abvent engineers working with Apple France, is bringing this capability to the Macintosh. What distinguishes simulation programs from mere animation is the use of real engineering rules to determine how much each element of a picture rotates, twists, or bends.

A typical simulation project might begin as a CAD drawing of a bridge that needs to be tested while a series of heavier and heavier trucks passes over it. Using Simul you define equations of motion for a truck, write the bending and deformation equations for the bridge under various loads, link the equations to the graphic elements of the bridge—and away you go. Simul calculates the physics of the situation at user-selected time intervals and displays a truck driving over a firm or sagging bridge.

Simul is creating great interest—especially at the computer lab in UCLA's chemistry de-



Dr. Sandra Lamb of UCLA's chemistry department computer lab compares laboratory results with those calculated by Simul, a powerful simulation program from France.

partment, where students might be able to run complicated experiments without a laboratory.

For simple moving images Simul can calculate approximately 3000 screens per second on a Mac Plus (it's written in assembly language), and this rate improves by a factor of 50 or so on a Mac II, with its 68881 math coprocessor. There's a wide range of simulation display choices, from slow motion to fast forward. However, some simulations are so complex that even Simul's fast calculations can't present the results in real time. In these cases, Simul can be directed to save the computation files from simulations for later playback.

A good simulation program is the final tool the Mac needs to compete with mainframe-linked workstations in mechanical engineering. Simul looks like it fills this serious computing need, and it's fun, too. List price of Simul is \$1195. For further information, call Abvent in Beverly Hills, California, at 213/659-5157.—*Charles Seiter*

Lotus's Modern Jazz: Something for Everyone



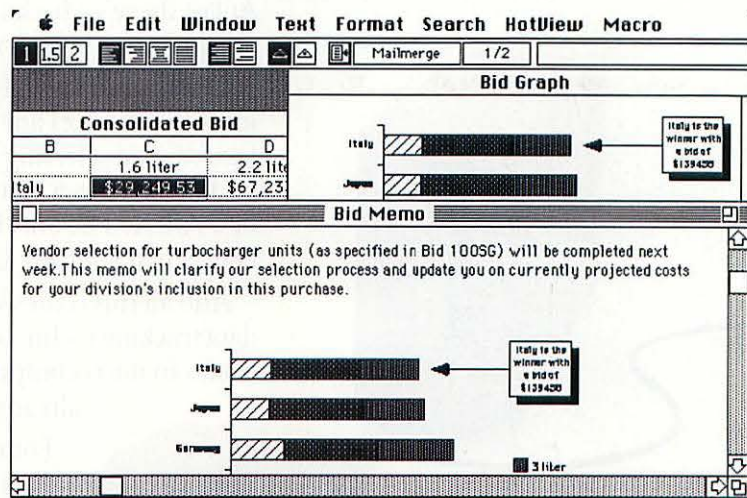
Lotus's Modern Jazz is an integrated business package that includes modules for word processing, databases, worksheets, graphics, communications, and forms. It's intended for casual users looking for an all-in-one

software solution: beginners in a business environment; and those who want maximum file transferability, both between modules of the program and between the principal business software of the Mac and MS-DOS worlds.

Modern Jazz is more a major upgrade of Jazz than a new product. One significant improvement, a function and command macro language, allows you to automate almost all the program's capabilities. For instance, you can program Modern Jazz to call a database, download some figures, insert those figures in a report, and print the resulting document. Complex functions can be started with a few keystrokes. And since this command language is similar to Symphony's, Lotus expects those familiar with Symphony to write many customized applications.

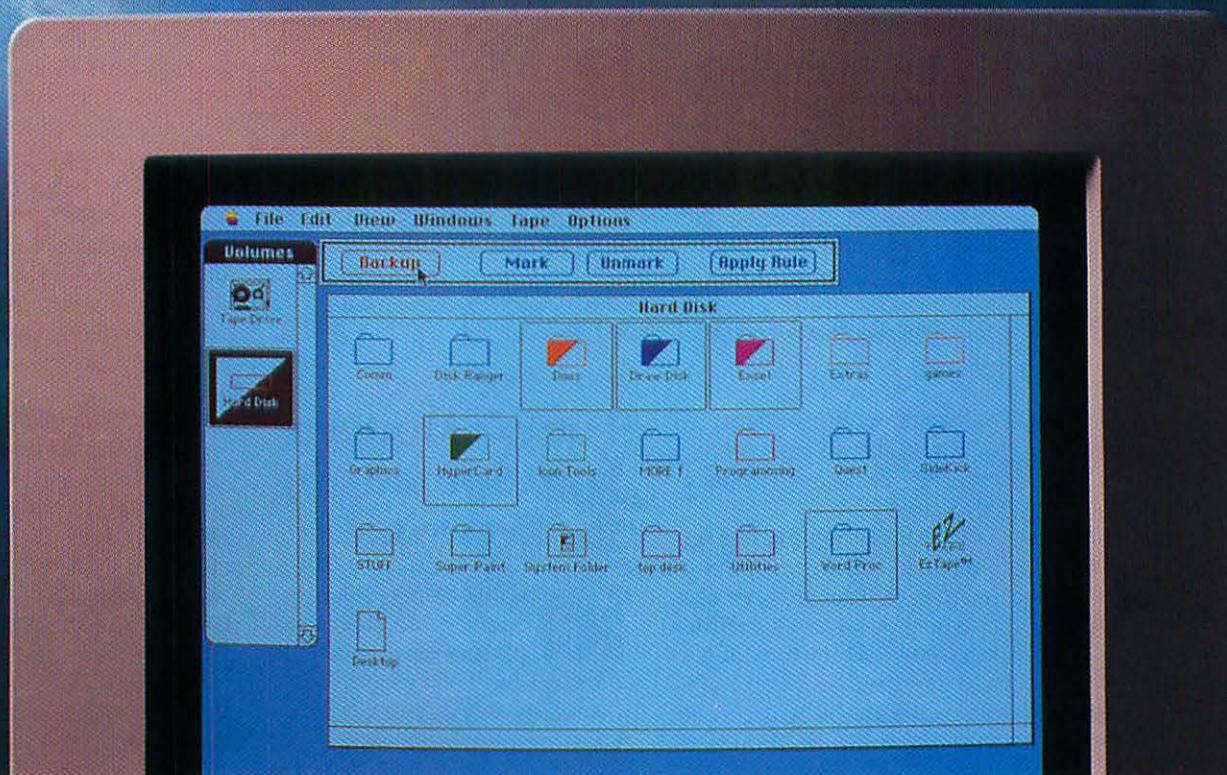
Modern Jazz improves on Jazz in other ways, too. It now includes a forms module and a beefed-up worksheet, and it's integrated with MultiFinder. Large screens, color, and more than one megabyte of RAM are also supported. Modern Jazz retains Jazz's Hotview: an important feature that links information between any of the

(continues)



Modern Jazz includes a scripting language that lets you create automatic functions like dialing a database and patching the resulting information into graphs and text.

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313/996-3300

Circle 82 on reader service card

modules so that changing information in one module changes the information in other modules as well. And new memory-management techniques are designed to eliminate Jazz's reputation as a memory hog.

List price of Modern Jazz is \$295. For more information, call Lotus in Cambridge, Massachusetts, at 617/577-8500.

—Scott Beamer

Backing Up the Nonprofits



Apple's donations of products to community groups is well known. But where do such groups turn for help once the hardware is installed and Apple's initial training period is completed?

In Chicago, more than 300 community groups—ranging from the Center for Street People to the Chicago City Ballet—turn to the Information Technology Resource Center.

For as little as \$200 per year, members can help themselves to a smorgasbord of computer literacy workshops, needs-analysis seminars, and hands-on training. Members can also sample software and hardware informally in the center's computer laboratory. Boasting 22 Macs, PCs, and UNIX systems, as well as an extensive software library, the lab places a special emphasis on programs geared toward the special accounting and fund-raising needs of nonprofit organizations.

Similar centers operate in a half-dozen other cities, but Chicago's is easily the largest and most extensive. Executive Director Deborah Strauss says that the Macintosh is a favorite among nonprofit groups—in part because of Apple's philanthropy, but also because of the machine's publishing prowess.



MICHAEL ABRAMSON

Deborah Strauss helps bring Macintosh capabilities to Chicago nonprofits.

She points out that desktop publishing is incredibly important to groups whose existence depends upon regular communication with their constituents. For further information, call the Information Technology Resource Center at 312/684-1050. —Daniel Brogan

Seeking the Best



Over a year ago, Record Newspapers, a group of community weeklies based in Port Jefferson, New York, networked 37 Macintosh Plus and SE computers, an equal number of hard disks, and four LaserWriter Plus printers.

The result? Instead of straining to put out two publications each week with two conventional phototypesetters, three input terminals, and lots of cutting and pasting, Record Newspapers has rapidly grown to five weekly papers and there's still no end in sight.

Record's archipelago of Macintoshes is networked with TOPS software and AppleTalk hardware. Each workstation

runs its own Microsoft Word 3.01; editors and production managers also use Quark XPress and Aldus's PageMaker 2.0a.

The big advantage of this setup is speed. At each workstation writers, editors, proofreaders, and production managers have everything they need for word processing, graphics, and page layout right on the hard disk. The network is used only for copying files, sending messages, and outputting.

Finished pages are printed in sections called tiles, using LaserWriter Plus printers that produce a resolution of 300 dots per inch (dpi), as opposed to a phototypesetter's 1200 to 2400 dpi. While the difference in resolution would be easily seen on glossy paper, it's more difficult to see on newsprint, especially when master pages are printed on Hammermill Laser Plus paper.

It's not all smooth sailing, however. Most of the time, TOPS can handle a user modifying a file on a hard disk at the

same time someone is sending another file to the disk. But once or twice a day the network crashes—a limitation more than a bug. The long-term solution will be to dedicate one Mac as an editorial drop-off point. In the interim, despite these crashes, the Mac system has proven an enormous success. —Kathy Esseks

Star Trek's Macs



With a million-dollar budget for each episode, "Star Trek: The Next Generation" is the highest-priced episodic television show in history. Also unusual is the degree to which Macintoshes are used in nearly every stage of producing "Star Trek."

A prime example of the Mac's involvement is the 15 to 20 minutes of specially composed music that accompanies every

(continues)



KEN COLLINS

Tom Baade networked 37 Macs to bring desktop publishing to a group of increasingly successful New York newspapers.

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"Star Trek: The Next Generation" uses plenty of Macs and synthesizers to create and produce its background music.

episode. Ron Jones, one of the series' composers, begins writing the music on his Macintosh II about ten days before going into the recording studio. Jones designs many custom sounds using Opcode Systems' patch editor/librarian for his Yamaha and Roland synthesizers.

During this process, Jones will save much of his work as MIDI sequences using Mark of

session is sort of an electronic band—just the three keyboard synth stations, three percussionists, and an Akai Electronic Wind Instrument.

During the recording sessions all musicians hear a click track in their headphones; the track is converted into timing codes that drive the Macintosh sequencers and ensure that the computer-produced music and the orchestra musicians will be in sync. This permits Jones to record in one pass music that would traditionally have required overdubbing; it also gives him the freedom to experiment with new scoring methods involving multiple tempi. —Christopher Yavelow



the Unicorn's Performer software. With Performer, he can make a rough tape of the various themes as a "temp track" to play against the picture while he works.

Usually, three synth players, each with a Macintosh and 9 to 15 synthesizers, are required to record the music. To get the 15 to 20 minutes of music on tape, there are two scoring sessions, each lasting between three and four hours. The first session includes an orchestra of 36 to 40 musicians in addition to the synth players, and the second

Stretch That Form



Have you ever used a drawing program to forge lots of lines and text into a form and then found something had to be changed? Sometimes it means drawing the whole form over again. Help is on the way with SoftView's FormSystem, due to be shipped in the third quarter of this year, which contains a set of "graphically intelligent" tools.

Here's how FormSystem works. You set the size of the form and then begin drawing vertical and horizontal lines. Inside the resulting boxes you place the desired text. At any time you can enter the graphic edit mode, which turns the cursor into a handle when it passes over a line. Push down on the mouse when the handle appears, and you can move any line to your heart's content. But notice, if you move a vertical line so there's not enough room for the text, the words automatically rewrap to fit the new area. Even multiple periods—those dot, dot, dots—increase or decrease in number to fill out a line. In a very real sense, your form becomes rubbery, able to stretch or contract vertically as well as horizontally while keeping text in proper proportion.

Once you've created a basic form, you'll be able to add spreadsheetlike calculations; draw or paste in graphics; out-

put and input information to several database formats, such as dBase; and produce independent screen and printed versions, for ease of reading on screen. By year's end, SoftView plans to release a networking version of FormSystem that will exchange data with common spreadsheet programs such as Excel and 1-2-3. For further information, call SoftView in Camarillo, California, at 805/388-2626.

New High in Color Graphics



Truevision plans to capture the high-end Macintosh video-card market—a position it already holds in the MS-DOS world with its Targa and Vista boards

(continues)

File Edit Options Forms

SoftView / Form 3800

Form 3800 General Business Credit

Department of the Treasury Internal Revenue Service

OMB No. 1545-0045

1986

Attachment Sequence No. 25

Name(s) as shown on return

Michael H. & Susan A. Moore

Identifying number

123 45 6789

Part I Tentative Credit

1	Investment credit (Form 3468, line 8)	1	1,111.11
2	Jobs credit (Form 5884, line 7)	2	2,222.22
3	Credit for alcohol used as fuel (Form 6478, line 11)	3	3,333.33
4	Credit for increasing research activities (Form 6765, line 20)	4	4,444.44
5	Low-income housing credit (Form 8586)	5	5,555.55
6	Employee stock ownership plan (ESOP) credit (Form 8007, line 3)	6	6,666.66

File Edit Options Forms

SoftView / Form 3800

Form 3800 General Business Credit

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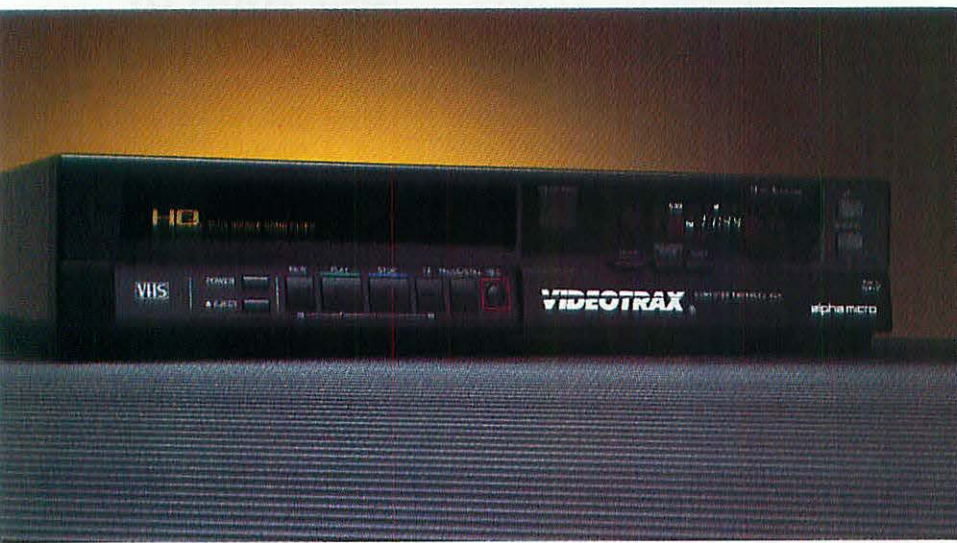
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6	Employee stock ownership plan (ESOP) credit (Form 8007, line 3)	6	6,666.66

SoftView's FormSystem lets you increase the font size of the top form to automatically create the new form on the bottom.

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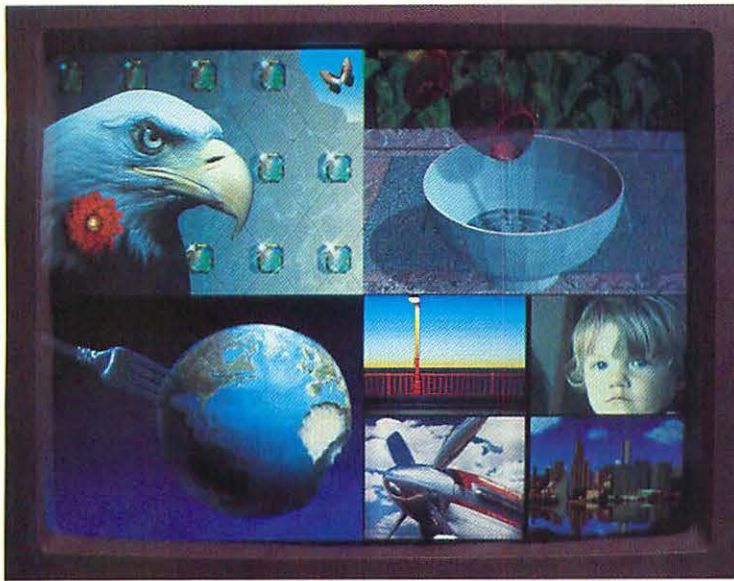
You can see it for yourself by visiting your nearest Videotrax dealer. And you can get the name of your nearest dealer by calling 800-992-9779 (in California, 800-821-0612).

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Macs can now produce four-color output that's suitable for high-quality commercial printing, using a color board from Truevision that renders the three primary colors plus black.

—with a 32-bit-per-pixel color video board designed for the Mac II.

The additional 8 bits per pixel—more than are available on the 24-bit cards built by RasterOps and SuperMac—can be used for four-color processing output (the other cards can handle only three colors) as well as for specialized video effects. Other potential applications include video and presentation slide production, digital pre-press and desktop production, computer-aided design, computer-aided engineering, and image processing.

The NuVista board offers two basic functions: recording and storing up to 32 screens of color video, and processing these and other graphic images. Once an image is edited, NuVista can send its color output to a videotape recorder, video monitor, or color printer.

NuVista is built around the Texas Instruments 34010, a 32-bit programmable graphics processing chip. Although other video boards use this chip as well, none of them fully implements its graphic capabilities due to unresolved technical problems. NuVista output is

fully compatible with NTSC (standard American television), PAL (European television), and a wide variety of Macintosh monitors.

The NuVista board is scheduled to ship by June. The suggested retail price is \$5995 for the 4-megabyte version and \$4250 for the 2MB version. For further information, call Truevision in Indianapolis, Indiana, at 317/841-0332.—*Scott Beamer*

Jungle Mac



Piranhas, screaming pihas, toucans, and giant morpho butterflies are just a few of the thousands of unique creatures that make the Amazon jungle one of the most exciting places on earth. But some 26,000 square kilometers of rain forest are felled each year—and conservationists are scrambling to save what's left. Helping in that task, busily generating reports and cataloging scientific readings, is a lone Macintosh computer.

It rests in a cherished, air-

conditioned enclave in the Amazonian capital of Manaus, Brazil, at the headquarters for the eight-year-old Minimum Critical Size of Ecosystems Project, operated jointly by the World Wildlife Fund and Brazil's Instituto Nacional de Pesquisas da Amazonia. The project's aim is



to track the changes that take place when part of the jungle is cut off from the rest by development—in the hope that patterns of extinction can be detected and then avoided.

As of last summer, scientists had identified 351 bird species, 42 types of frogs, 25 lizard species, 52 species of mammals, and hundreds of species of trees. Much of the data resulting from these identifications is fed into computers, including the Mac 512KE brought to Manaus two years ago.

Brazilian office staff uses a Portuguese version of MacWrite 4.5 to churn out critical documents with the help of a recently added 800K external disk drive, and graduate students employ graphics software to enhance reports.

Bird-watcher Randy Downer brought in a 20-megabyte hard disk and logged in 32,676 bird captures before it broke down. But perhaps the most ambitious user is Wilson Roberto Spironelo, a graduate student who spent 16 months tracking brown capuchin monkeys around the jungle, then logged his data into charts and reports on the Mac.—*Bob Buder*

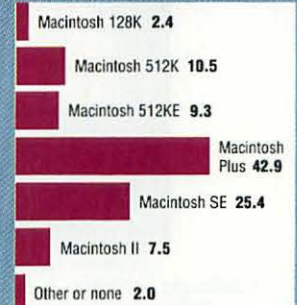
Macworld News: Readers' Views



This month's *Macworld News: Readers' Views* charts are based on questionnaires sent to 1000 randomly selected *Macworld* subscribers. We asked about the number of repairs required for various Macintosh computers and peripherals. Approximately 500 subscribers responded to this questionnaire, giving these results an accuracy of plus or minus 4 percentage points.

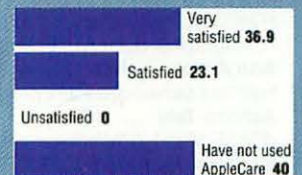
We welcome your ideas for future *Macworld News: Readers' Views* surveys. Please send your suggestions to: News Editor, *Macworld*, 501 Second St., San Francisco, CA 94107. Your ideas are important to us. □

What type of Macintosh do you use most often?



Percentage of 504 respondents

If your Mac is registered for AppleCare, how satisfied are you with AppleCare service?



Percentage of 65 respondents

Readers say the Plus is still very popular. AppleCare users seem quite satisfied.

We deliver

SOFTWARE

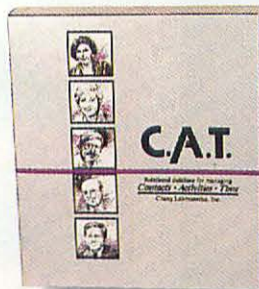
NCP denotes not copy-protected.
CP denotes copy-protected.

Aba Software ... NCP
"Draw it again, Sam" (paint program) ... \$94.
Access Technologies ... NCP
Trapeze 2.0 (spreadsheet & graphics) ... 205.
Activision ... NCP
Postcards (clip-art, card stock) ... 20.
Business Class (atlas, req. Hypercard) ... 30.
Focal Point (organizer, req. Hypercard) ... 59.
Aegis Development ... NCP
Doug Clapp's Word Tools ... 42.
Affinity Microsystems ... NCP
Affinifile (DA filer) ... 49.
Tempo 1.2 (power user's macro utility) ... 52.
Tempo II (updated, auto installation) ... 89.
Allan Bonadio Associates ... NCP
Expressionist 1.1 (equation processor) ... 46.
ALSoft ... NCP
DiskExpress (maximize disk performance) ... 26.
Font/DA Juggler Plus (w/sound utility) ... 32.



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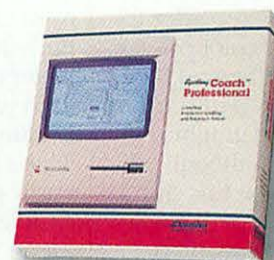
Altsys ... NCP
FONtastic Plus (advanced font editor) ... 47.
Fontographer (LaserWriter font editor) ... 239.
Ann Arbor ... NCP
FullPaint (advanced Paint program) ... 49.
Ashton-Tate ... NCP
dBASE Mac 1.0 (relational, req. MacPlus) ... 295.
Batteries Included ... NCP
Thunder! 1.1 (spelling checker) ... 30.
Berkeley System Design ... NCP
Stepping Out (screen extender) ... 54.
Blyth ... NCP
Omnis 3 Plus/Express (database) ... 275.
Omnis 3 Plus/Express (2-5 users) ... 489.
Omnis 3 Plus/Express (6-10 users) ... 1249.
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Country or Heavy Metal Rock Disk ... 15.
Borland International ... NCP
Turbo Pascal Tutor ... 49.
Numerical Methods Toolbox ... 65.
Sidekick 2.0 (includes MacPlan) ... 65.
Turbo Pascal (HFS compatible) ... 65.
Eureka: The Solver ... 129.



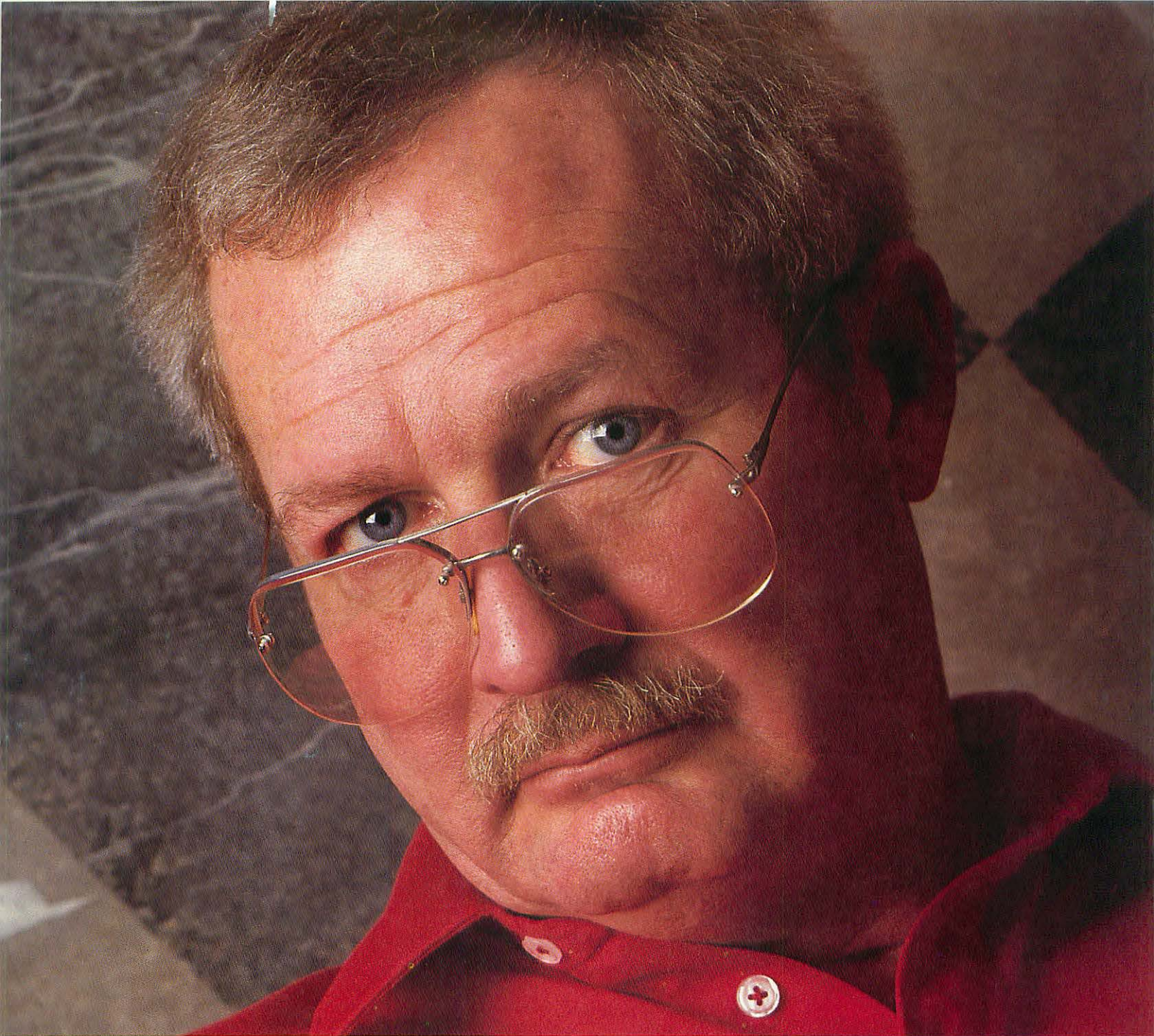
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Graphidex (DA graphics organizer) ... 65.
DesignScope (electronic circuit design) ... 128.
MathView Professional (num. analysis) ... 145.
StatView 512+ (full-featured) ... 175.
Bravo Technologies ... NCP
MacCalc (easy to use spreadsheet) ... 79.
Broderbund ... CP
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Geometry (over 350 problems!) ... 60.
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Chang Labs ... NCP
Rags to Riches Ledger ... 120.
Rags to Riches Payables ... 120.
Rags to Riches Receivables ... 120.
Rags to Riches Three Pak ... 289.
C.A.T. (contacts, activities, time) ... 239.
Inventory Control or Professional Billing ... 239.
Professional Three-Pak ... 359.
Retail Business 3 Pak ... 359.
Cortland ... CP
TopDesk 2.3 (7 new desk accessories) ... 32.
Cricket Software ... NCP
Pict-O-Graph (color on the Mac II) ... 105.
Cricket Graph (multiple windows) ... 119.
Cricket Draw (advanced draw capabilities) ... 169.
DataViz ... NCP
MacLink Plus (transfer Mac/IBM data) ... 145.
Davidson ... CP
Math Blaster! (grades 1-6) ... 27.
Deneba Software ... NCP
Merriam-Webster's Thesaurus ... 36.
Comment (electronic Post-It notes) ... 56.
Canvas 1.0 (includes desk accessory) ... 109.

Coach (interactive spell checker) ... \$59.
Coach Professional ... 109.
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RAMSnap (RAM Disk/Disk Cache) ... 21.
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Market Manager Plus (portfolio mgmt.) ... 159.
Dubl-Click Software ... NCP
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World-Class Fonts! (both volumes) ... 36.
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Deluxe Music Construction Set 2.0 ... 61.
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Easy3D (create solid 3D objects) ... 79.
Pro 3D (3D shaded modeling) ... 199.
Enzan-Hoshigumi USA ... NCP
Japanese Clip Art Scroll 1 "Heaven" ... 59.
Japanese Clip Art Scroll 2 "Earth" ... 59.
Japanese Clip Art "Borders" Scroll ... 69.
MacCalligraphy (create unique designs) ... 115.
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Hard Disk Partition ... 45.
Hard Disk Util (program backup) ... 54.
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TimeMasters (learn about time, ages 4+) ... 22.
KidsTime (educational, ages 3-8) ... 26.
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Deneba Software ... NCP
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"I placed another order a week later. You told me it was out of stock, and might not arrive for 10 days. *It arrived here the next morning!* This kind of service is ridiculous. I'm becoming a little paranoid about thinking of the items I need. Now that you are promising overnight delivery, things may start arriving *before* I order them."

Lee Erisman
Lincoln, Nebraska

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Survivor Software ... NCP

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Target ... NCP

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TML Systems ... NCP

TML Source Code Library 55.

TML Pascal (compiler, req. 512k) \$59.

TOPS ... CP

TOPS Teleconnector (DIN8 or DB9) 45.
TOPS (file-server/LAN software) 119.
NET PRINT (formerly TOPS PRINT) 119.
TOPS for the PC 119.
TOPS Flashcard (network add-in card) 169.

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myDiskLabeler w/Color (req. ImageWriter II) 31.
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216 Smart Labels (for ImageWriter) 15.

Working Software ... NCP

Lookup (90,000 word dictionary) 29.
Findswell (locate documents fast) 29.
Spellswell (spelling checker) 42.
Spellswell Legal or Medical Dictionary 56.

GAMES

Accolade ... CP

Hardball (baseball simulation) 23.

Activision ... CP

Tass Times in Tonetown 21.
Shanghai (Mah Jongg strategy) 24.
Portal (sci-fi novel) 30.

Addison-Wesley ... CP

Puppy Love (you and your dog will love it!) 19.

Ann Arbor ... CP

Grid Wars (3D arcade) special
Normally \$22. Free w/purchase of FullPaint.

Avalon Hill ... CP

MacPro Football (req. 1 Meg) 28.
MacPro Football 85 Team or Season 16.

Baudville ... CP

Guitar Wizard (learning tool for guitar) 22.
Ted Bear's Rainy Day Games 22.

Blue Chip ... CP

Millionaire (stock market) 35.

Broderbund Software ... CP

Lode Runner (over 150 levels) 24.
Ultima III (fantasy adventure) 24.
Ancient Art of War (military strategy) 27.
Toy Shop (create working models) 30.

Bullseye ... CP

Ferrari Grand Prix (Formula One racing) 32.
Fokker TriPlane Flight Simulator 32.

Electronic Arts ... CP

Skyfox, Pinball Construction Set, Dr J vs Larry Bird, Archon each 15.
Ogre (tank simulation) 20.
Patton vs Rommel or Scrabble 27.
Chessmaster 2000 28.

Epyx ... CP

Sub Battle Simulator (NCP) 24.
Winter Games (Olympic events) 24.

Greene, Inc. ... NCP

Crystal Quest (color arcade on Mac II) 24.

Hayden Software ... CP

Perplexx (scrabble-type game) 24.
Sargon III (9 levels of chess) 29.

Infinity Software ... CP

Go (4000-year-old strategy game) 27.
Grand Slam (tennis, req. 512k) 27.

Infocom ... CP

Leather Goddesses, Nord & Bert, Bureaucracy, Hollywood Hyjinx, Lurking Horror, Plundered Hearts, Borderzone, Stationfall each 24.
Beyond Zork 30.
Classic Mystery Library: Moonmist, Suspect, & Witness 36.
Science Fiction Classics: Hitchhiker's, Planetfall, & A Mind Forever Voyaging 36.
Zork Trilogy 42.
Invisicues Hint Booklets (please specify) ... 6.



T/Maker ... NCP

ClickArt EPS Illustrations—Accent your work with 180 high-quality PostScript® images. Artwork can be resized without losing detail or sharpness; resolution limited only by printer .. \$79.

door to door...

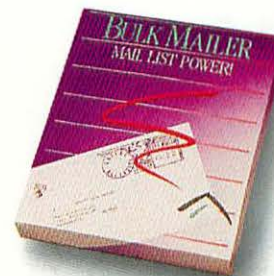


OWL International ... NCP
Guide 2.0—Flow through your information naturally using intuitive links rather than rigid program formats. Your information becomes an interactive tool \$119.

Greene, Inc. ... NCP	
QuickDEX (address book)	32.
Hayden Software ... CP	
Score Improvement for the SAT	58.
Hayes ... NCP	
Smartcom II (communications)	88.
Ideaform ... NCP	
MacLabeler or DiskQuick	27.
201 Quicklabels	18.
HyperBook Maker (print stacks into book) ..	42.
Imagine ... NCP	
Smart Alarms (DA reminder system)	35.
Multi-user Appointment Diary	89.
Infosphere ... CP	
LaserServe (network software)	62.
ComServe (NCP, modem sharer)	124.
MacServe (network software)	159.
Innovative Data Design ... NCP	
MacDraft 1.2A (requires 512k)	149.
Kent Marsh Ltd.	
The NightWatch (hard disk security)	call
MacSafe (advanced security program)	call
LaserWare ... CP	
LaserWorks (requires 512k, LaserWriter) ..	189.
LaserPaint (requires Mac Plus)	314.
LaserPaint Color II (256 gray scales, supports	
256 Pantone & 8 Bit color; NCP)	379.
Layered ... CP	
Notes for...Excel or Microsoft Works	40.
Notes for...PageMaker or Ready,Set,Go!3 ..	40.
Notes for...Microsoft Word	40.
Learning Company ... CP	
Reader Rabbit (ages 7-12)	39.
Legisoft/Nolo Press ... NCP	
WillMaker 2.0 (prepare your own will)	29.
Letraset ... NCP	
Image Studio (image processing software) ..	279.
Ready,Set,Go! 4.0 (page layout)	279.
Linguist's Software ... NCP	
Tech (1000 different symbols)	59.
LaserTech	79.
FOREIGN LANGUAGE FONTS	
SuperFrench/German/Spanish	39.
MacKana/Basic Kanji	39.
MacHebrew or MacKanji	59.
MacHindi Sanskrit (Amjer)	59.
MacSemitic/Coptic/Devanagari, MacKorean,	
MacThai, MacGreek, MacHieroglyphics ..	59.

MacArmenian, MacGeorgian, MacCyrillic,	
MacArabic/Farsi, MacAkkadian	each \$59.
MacHebrew Scriptures	79.
MacGreek New or Old Testament	79.
MacChinese (supplements available)	79.
MacGreek/Hebrew/Phonetics	89.
FOREIGN LANGUAGE LASER FONTS	
LaserFrench/German/Spanish	79.
LaserGreek or LaserHebrew	79.
LaserTransliterator	79.
LaserKorean	89.
LaserCyrillic	115.
Living Videotext ... NCP	
More 1.1C (outlines, windows, & tree charts)	175.
Lundeen & Associates ... NCP	
WorksPlus Spell (spell checker for Works) ..	46.
WorksPlus Command (macros for Works) ..	61.
MacroMind ... NCP	
VideoWorks II (animation tool)	118.
MacroPac International ... NCP	
101 Macros for Excel	44.
Micro Analyst ... NCP	
Mac Zap (recover crashed hard disks)	39.
MECA ... NCP	
Managing Your Money (finance)	129.
Microlytics ... NCP	
Word Finder (synonym finder)	37.
Microsoft ... NCP	
Basic Interpreter 3.0	61.
Chart 1.02 (42 chart styles, CP)	72.
Microsoft Write 1.0 (w/spell checker)	109.
Multiplan 1.1	110.
File 1.05	110.
Basic Compiler 1.0	119.
Fortran 2.2 (compiler)	169.
Works 1.1 (integrated tool)	185.
Microsoft Mail (up to four users)	195.
Microsoft Mail (up to 10 users)	339.
Microsoft Mail (up to 20 users)	525.
Excel 1.06 (power spreadsheet)	239.
Word 3.01 (powerful word processor)	239.
PowerPoint (presentations)	239.
Migent ... NCP	
In House Accountant (small business)	119.
Miles Computing ... NCP	
Mac the Ripper Vol. 3 (req. Paint program) ..	27.
Orchestra of Fonts Vol. 4 (30 different fonts)	27.
Peoples, Places & Things Vol. 5	27.
Mindscape ... NCP	
The Perfect Score: SAT (CP)	46.
ComicWorks (create your own comics)	47.
GraphicWorks 1.1 (newsletters & posters) ..	85.
Monogram ... NCP	
Forecast (tax planning)	40.
Dollars & Sense (home, small business)	81.
Business Sense (full-featured)	282.
Nantucket ... NCP	
McMax (dBASE III compatible)	179.
Nashoba Systems ... NCP	
FileMaker Plus (feature-packed database) ..	149.
North Edge Software ... NCP	
Timeslips III (time & expense tracking)	119.
Odesta ... NCP	
Double Helix II (relational, custom menus)	339.
Olduvai Software ... NCP	
DA-Switcher (unlimited desk accessories) ..	25.
Post ART (clip art, 3 disk set)	35.
Icon-It! (create custom icon bars)	39.
FontShare (share PostScript® fonts)	159.
Read-It!TS (OCR software for Thunderscan)	79.
Read-It! (300 dpi OCR software)	199.

OWL International ... NCP	
Guide 2.0 (hypertext, free-form info)	\$119.
Guide Envelope System	99.
Palantir ... NCP	
MathFlash (flash card drills)	26.
WordPlay (crossword puzzles)	26.
MacType (typing instruction, NCP)	31.
inTalk (communication to emulation, NCP)	119.
Passport Designs ... CP	
Mastertracks Pro (music editor)	259.
PBI Software ... NCP	
HFS Locator Plus (DA organizer for HFS) ..	26.
Personal Computer Peripherals ... NCP	
HFS Backup	28.
ProVUE Development ... NCP	
OverVUE 2.1 (power-packed database)	149.

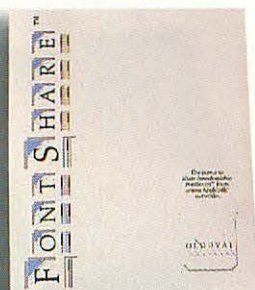


Satori ... NCP
BulkMailer—Tame that mass-mailing list into a single easily managed file! Search and sort alphabetically or by zip code \$79.
BulkMailer Plus—up to 90,000 names. 195.

Rubicon Publishing ... CP	
Dinner At Eight-Encore Edition Bundle	51.
Satori ... NCP	
BulkMailer 3.0 (mailing lists)	79.
BulkMailer Plus (up to 90,000 names)	195.
Legal Billing (attorneys to accountants) ..	369.
Legal Billing II (full trust accounting)	549.
Project Billing (architects to engineers) ..	439.
Silicon Beach Software ... NCP	
Silicon Press (printer utility, 512k)	41.
World Builder (program creator)	41.
SuperPaint (advanced graphics program) ..	79.
Simon & Schuster ... NCP	
Typing Tutor IV (typing instruction)	35.
SoftStyle ... NCP	
Epstart (Epson printer driver)	27.
Laserstart (Hewlett-Packard Laserjet)	58.
Printworks for the Mac (Dot Matrix)	43.
Printworks for the Mac (Laser printers)	85.
SoftView ... NCP	
MacInUse (time-use manager)	42.
TaxView Planner 1987-1991	49.
MacInTax (the complete tax program!)	65.
Software Discoveries ... NCP	
Merge Write (MacWrite mail merge)	35.
Record Holder Plus (data manager)	45.
Software Supply ... NCP	
Suitcase (font and DA utility)	37.
PowerStation (alternative to Finder)	37.
Software Ventures ... NCP	
Microphone 1.1 (includes Glue™)	119.
Microphone II (MultiFinder compatible) ..	229.

Disks to Drives.

MacroMind ... NCP	
Mazewars+ (play via modem or network) ...	\$31.
Microsoft ... CP	
Flight Simulator (the Mac takes flight) ...	32.
Micro Sports ... CP	
MSFL Pro League Football ...	32.
Miles Computing ... CP	
Down Hill Racer (3D ski simulation) ...	24.
Harrier Strike Mission II ...	27.
Fool's Errand (optional hint booklet avail.) ...	27.
Mindscape ... CP	
Crossword Magic ...	30.
Balance of Power (world politics) ...	30.
King of Chicago (req. minimum 512E) ...	30.
Shadowgate (castle adventure) ...	30.
Uninvited (mystery adventure) ...	30.
Deja Vu: A Nightmare Comes True. ...	30.



Olduvai Software ... NCP
FontShare—Share and share alike—and that means your PostScript® downloadable fonts, too! Allows all Macs on a network to share fonts residing on a server ... **\$159.**

Trust & Betrayal: The Legacy of Siboot ...	30.
Defender of the Crown (req. 800k drive) ...	30.
Olduvai Software ... NCP	
Maze Survival (action game) ...	21.
PBI Software ... CP	
Strategic Conquest (multi-user) ...	35.
Primera Software ... CP	
Smash Hit Racquetball (top-rated!) ...	15.
Smash Hit Racquetball II ...	22.
Psion ... CP	
Psion Chess (3D and multi-lingual) ...	31.
Sierra On-Line ... CP	
Leisure Suit Larry (swinging single life) ...	23.
King's Quest I, II or III. ...	30.
Space Quest (save the universe!) ...	30.
Silicon Beach Software ... NCP	
Airborne! (CP, digitized sounds) ...	20.

Enchanted Scepters (CP, over 200 scenes) ...	\$21.
Dark Castle (top-rated arcade action) ...	27.
Beyond Dark Castle (the wait is over!) ...	27.
Apache Strike (3D helicopter action) ...	27.
Simon & Schuster ... CP	
Star Trek—The Kobayashi Adventure ...	24.
Sir-Tech ... CP	
Mac Wizardry (high-rated fantasy) ...	35.
SPHERE, Inc. ... NCP	
Tellstar II (No. & So. hemispheres) ...	15.
GATO (submarine simulator) ...	26.
Orbiter (space shuttle simulation) ...	26.
Falcon (F-16 flight simulation) ...	26.
XOR ... NCP	
NFL Challenge (w/illustrated handbook) ...	64.

HARDWARE

Manufacturer's minimum limited warranty period is listed after each company name. Some products in their line may have longer warranty periods.

Apricorn ... 1 year	
ApriCord Mac (parallel converter) ...	75.
AST Research ... 6 months	
Mac 286 (MS-DOS on your Mac II) ...	1079.
AST TurboScan (300 dpi scanner) ...	1369.
AST TurboScan Flatbed ...	1369.
AST TurboLaser P/S ...	3395.
Curtis Manufacturing ... lifetime	
SURGE SUPPRESSORS	
Safestrip (6 outlets) ...	21.
Diamond (6 outlets) ...	32.
Emerald (6 outlets; 6 ft cord) ...	36.
Sapphire (3 outlets; EMI/RFI filtered) ...	47.
Ruby (6 outlets; EMI/RFI filtered; 6 ft cord) ...	59.
DataDesk ... 2 years	
MAC-101 (high-performance keyboard) ...	139.
Dove Computer ... 90 days	
Toolkit (clamp, torx driver & wrist strap) ...	15.
SCSI Interface/Port ...	85.
MacSnap 524E (512E to 1 Meg) ...	156.
MacSnap 524 (512k to 1 Meg) ...	175.
MacSnap 524S (512E to 1 Meg w/SCSI) ...	219.
MacSnap 548E (512E to 2 Meg) ...	389.
MacSnap 548 (512k to 2 Meg) ...	399.
MacSnap 548S (512E to 2 Meg w/SCSI) ...	449.
MacSnap 2S (1 Meg to 2.5 Meg) ...	489.
MacSnap 4S (1 Meg to 4 Meg) ...	969.
MacSnap 8S (for Mac II, to 8 Meg) ...	1939.
MacSnap Plus 2 (MacPlus to 2 Meg) ...	289.
MacSnap Plus 2H (MacPlus/SE to 2.5 Meg) ...	489.
MacSnap Plus 4H (Plus/SE/II to 4 Meg) ...	969.
68020 ACCELERATOR BOARDS FOR MAC SE	
Model MCE 1 (basic 16 MHz, 0 Meg of memory) ...	585.
Model MSE 2 (MSE 1 with 1 Meg) ...	\$779.
Model MSE 3 (MSE 1 with math co-processor) ...	779.
Model MSE 4 (MSE 1 with 1 Meg & math co-processor) ...	975.
1024 Option (1 Meg accelerator or Mac II memory expansion) ...	195.
Math Kit (math co-processor chip set) ...	225.
Ergotron ... 1 year	
Mouse Cleaner 360° ...	15.
MacTilt or MacTilt SE ...	68.
MacTilt (for large monitor) ...	85.
Farallon Computing ... 1 year	
PhoneNET-AppleTalk 120 ...	9.
PhoneNET PLUS (DB-9 or DIN-8) ...	44.
PhoneNET StarController™ w/StarCommand™ software ...	1395.
PhoneNET StarController™ Wiring Kit: Punch Down Block ...	69.
PhoneNET CheckNET™ (multi-user) ...	69.
MacRecorder™ Sound System ...	149.
TrafficWatch (monitor network) ...	159.
Hayes ... 2 years	
Smartmodem 1200 ...	299.
Smartmodem 2400 ...	449.
MacPlus 1200 or 2400 Package ...	call
Kensington ... 1 year	
Appletalk Cable Clips or Connectors. . each 1.	
Mouseway (mouse pad) ...	8.
Mouse Pocket (for your idle mouse) ...	8.
Mouse Pocket (ADB) ...	8.
Mac Plus/Mac SE Cover ...	9.
ImageWriter II Dust Cover ...	9.
Printer Stand ...	16.



Microsoft ... NCP
PowerPoint—Compose complete boardroom-quality presentations. Design and arrange 35mm slides, flipcharts, overhead transparencies, etc, all within one program. ... **\$239.**

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*Defective software replaced immediately. Defective hardware replaced or repaired at our discretion.

DA's to Databases.

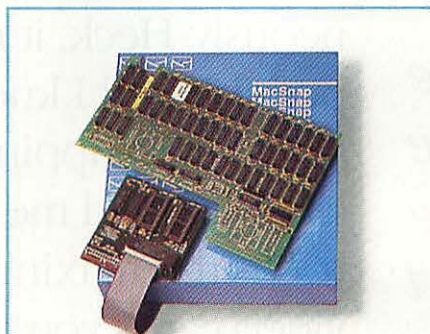
Mouse Cleaning Kit w/Mouse Pocket . . .	\$17.
Disk Drive Cleaning Kit	20.
Macintosh II Stand	21.
Tilt/Swivel	22.
Universal Copy Stand	22.
Extra Long ADB Keyboard Cable	28.
Anti-glare Filter (for MacPlus or SE)	33.
Surge Suppressor	34.
Apple Security Kit	34.
Macintosh II Monitor Cable	37.
Printer Muffler (80 column)	37.
Printer Muffler (132 column)	50.
Printer Muffler Stand (80 column)	25.
Control Center	62.
A-B Box (for the Mac Plus)	64.
System Saver Mac	64.
Turbo Mouse (for the MacPlus & SE)	82.
Koala Technologies ... 90 days	
MacVision 2.0 (digitizer)	225.
Kraft Systems ... 1 year	
3-Button QuickStick	39.
Migent ... 1 year	
Pocket Modem (ext. 300/1200 baud)	168.
Mirror Technologies ... 1 year	
Magnum 800 External Drive (platinum)	199.
MagNet 30x (w/cable & print spoolers)	699.
MagNet 40x (w/cable & print spoolers)	859.
Magnet 40/40 (40 Meg/40 Meg tape)	1769.
Magnum Tape 40 Backup	call
MSC Technologies ... lifetime	
A+ Mouse (optical mouse)	69.
A+ Mouse ADB (for Mac SE & II)	87.
Nutmeg Systems ... 90 days	
Nutmeg 15" Monitor (for MacPlus or SE)	1295.
Nutmeg 15" Monitor (for Mac II)	1395.
Nutmeg 19" Monitor (for MacPlus or SE)	1495.
Nutmeg 19" Monitor (for Mac II)	1595.
Nuvotech	
EasyNet/AppleTalk cable	6.
TurboNet (DIN8 or DB9 connector)	28.
Orange Micro ... 1 year	
Grappler (universal parallel interface)	64.
Passport Designs ... 90 days	
Passport MIDI Interface	95.
Personal Computer Peripherals ... 2 years	
WSI (connects Apple HD 20 to SCSI)	295.
MacBottom HD 21 Meg SCSI	749.
MacBottom HD 21 Meg SCSI w/Modem	915.

MacBottom HD 32 Meg SCSI	\$899.
MacBottom HD 32 Meg SCSI w/Modem	1045.
MacBottom HD 45 Meg SCSI	1159.
MacBottom HD 45 Meg SCSI w/Modem	1295.
MacBottom IHD-144 Meg (for Mac II; 1 yr.)	2195.
Practical Peripherals ... 5 years	
1200 Baud External Modem	109.
2400 Baud External Modem	189.
SoftStyle ... 90 days	
MacEnhancer (for plotters to printers)	159.
Summagraphics ... 90 days	
MacTablet 12" x 12"	379.
Systems Control ... 2 years	
MacGard (surge protection)	55.
Thunderware ... 90 days	
ThunderScan 4.0 with PowerPort	199.
Mac II Power Accessory	42.
Western Automation	
DASCH RAMdisk 2000K	399.

DISKS

Double-sided diskettes.

Sony 3 1/2" DS/DD Disks (box of 10)	18.
---	-----



Dove Computer ... 90 days
MacSnap 548S—Take 2 giant steps forward: increase your memory to 2 Meg. and add a SCSI port. User installable. Requires 512E (tools sold separately) **\$449.**

Fuji 3 1/2" DS/DD Disks (box of 10)	19.
Verbatim 3 1/2" DS/DD Disks (box of 10)	19.
MAXELL 3 1/2" DS/DD Disks (box of 10)	20.

INFORMATION SERVICES

CompuServe	
CompuServe Information Service	24.
Grolier's Online Encyclopedia	32.
Dow Jones	
Dow Jones News/Retrieval Membership Kit	24.

ACCESSORIES

Clean Image Ribbon Co.	
Clean Image Ribbon Kit	12.
Computer Coverup	
External 800k Drive Cover	4.
ImageWriter II Cover	8.
Mac Plus or Mac SE Cover Set	10.
I/O Design	
Available in navy blue.	
Imageware II (ImageWriter II carry case)	49.



True BASIC ... NCP
True BASIC 2.0—By the people who know what BASIC should be! Kemeny & Kurtz—original authors of the BASIC language. New version includes interpreter and compiler **\$119.**

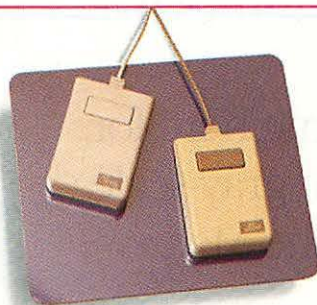
Macinware SE (Mac SE carry case)	76.
Kalmar Designs	
Teakwood Roll-top Case (holds 45 disks)	14.
Teakwood Roll-top Case (holds 90 disks)	20.
Teakwood Roll-top Case (holds 135 disks)	27.
Moustrak	
Moustrak Pad (standard 7" x 9")	8.
Moustrak Pad (large 9" x 11")	9.
Ribbons	
ImageWriter Ribbons	4.
Available colors: black, blue, brown, green, orange, purple, red, yellow and silver.	
Rainbow Pack (6 single color ribbons)	20.
Multi 4-Color Ribbon (req. ImageWriter II)	9.
Sensible Softworks	
Quality "MacAttire" nylon dust covers	7-17.
High Trek ImageWriter II carry case	49.
High Trek Mac SE & ext. kybd. carry case	69.

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MSC Technologies ... Lifetime
A+ Mouse—An all optical mouse with no moving parts. Lightning fast, exceptionally accurate cursor control. Includes mouse pad.
A+ Mouse **\$69.**
A+ Mouse ADB **\$87.**

The Mac II in Black

by Bruce F. Webster

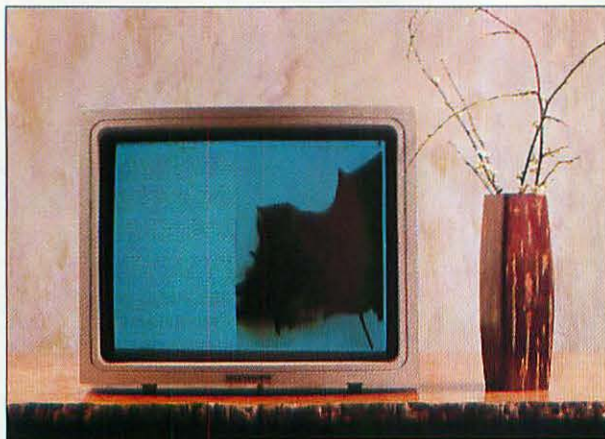
*Seven monochrome
and gray-scale
monitors for the
Mac II compared*

Well, pilgrims, I tried. I really did. I mean, ever since the Macintosh II was announced with its six slots, each capable of driving a video display, I've wanted to set up a Mac II with six monitors going simultaneously. Heck, it might even be possible. All I know is that several hours of swapping and rearranging cards has led me to conclude that five is the maximum number of video cards you can get running with a Mac II. I've gotten several different combinations of five going simultaneously—in fact, I've got five running as I write this—but adding the sixth card always causes the Mac II to hang during start-up.

But that's not what you came here for, right? You want to know all about gray-scale and monochrome monitors for the Mac.

and White





Viking

Monterm's 19-inch gray-scale monitor has a glare-free, easy-to-read display. Its 72-dpi resolution means you won't have to squint to read the fine print.

You've come to the right place. However, the usual warnings are in order: any Mac II market is a rapidly moving target, and new products will be out there by the time you read this.

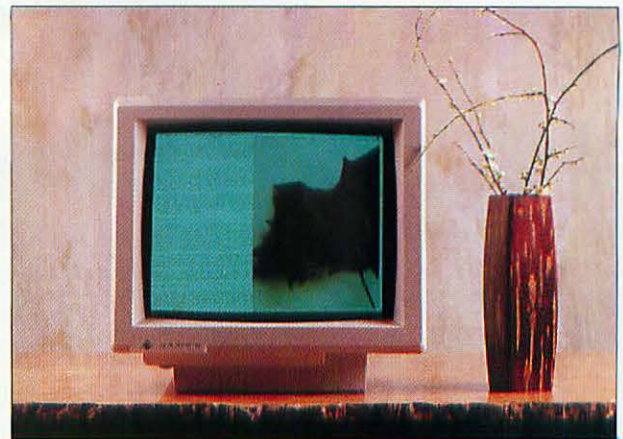
Terms of Discernment

Three basic types of video displays are available for the Macintosh II: monochrome, gray-scale, and color. A monochrome display shows everything—just in black and white. For example, the Apple icon in the upper-left corner of the menu bar is solid black. This type of display tends to be the cheapest, since it requires the least amount of memory (1 bit per pixel) on the video card and because good, high-resolution monochrome monitors are much cheaper than color monitors.

Gray-scale displays work sort of like your color TV with the tint turned all the way down. You get shading—for instance, you can see the separate color bands on the Apple icon—but there is no actual color. Everything goes from white to black, with shades of gray in between. The number of shades available depends upon the number of bits allocated for each pixel. For example, a display with eight bits per pixel gives you 28 or 256 shades of gray (including black and white).

Color displays show everything in colors—including, if you wish, black, white, and shades of gray. The Mac II supports a palette of 16 million colors; the

Bruce F. Webster is a computer mercenary who recently relocated to the West Coast "to be where the action is," whatever that means. He can be reached c/o Macworld.



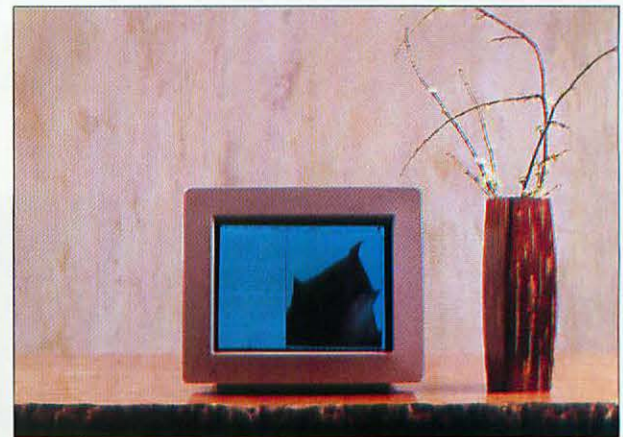
The Big Picture IQ

The gray-scale brother of E-Machines' Big Picture lets you display images in 256 shades of gray as well as in black-and-white.



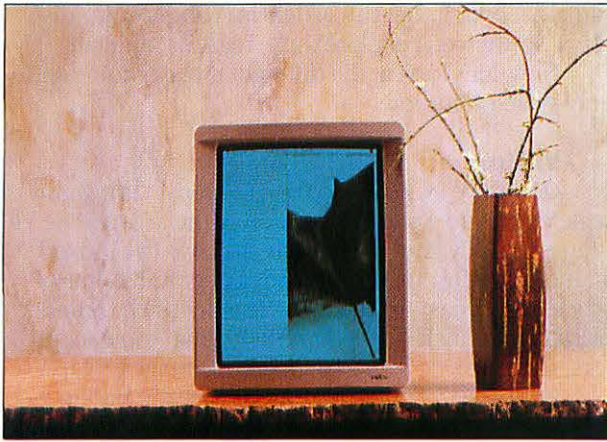
LaserView

Sigma Designs allows you to switch between two resolutions, but it only displays up to four gray shades. The new case has front-mounted contrast and brightness controls.



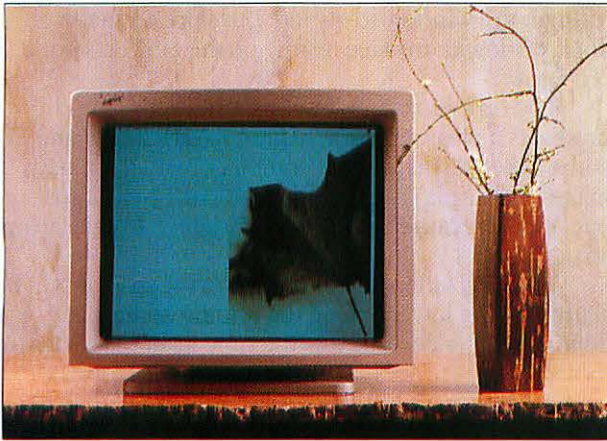
Apple High-Resolution Monochrome

Apple's original gray-scale offering is too small for full-page work but offers the highest-quality picture and the greatest flexibility (2, 4, 16, or 256 shades).



Full Page Display

The monochrome monitor with the smallest footprint of the monitors we tested comes with valuable software and even supports a virtual display mode.



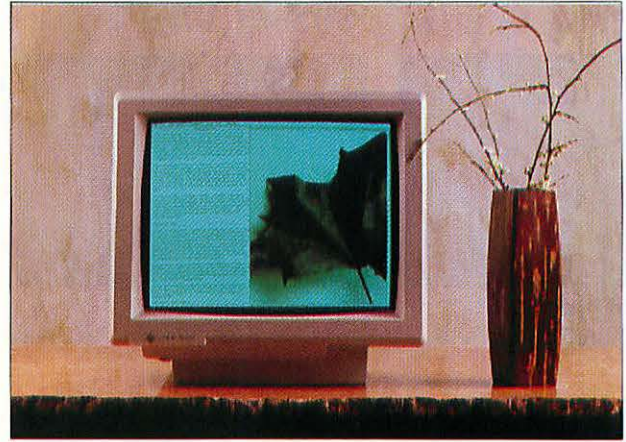
MegaScreen 2001

MegaGraphics' monochrome monitor displays more pixels than most, yet retains a resolution (75 dpi) that won't result in tiny characters.

actual number of colors available on screen at any moment depends, again, upon the number of bits per pixel. A color display requires an RGB (red-green-blue) monitor; these tend to be expensive and bulky, at least compared to monochrome monitors.

Why Choose Mono?

Because it's cheaper. Face it, after you read the December 1987 article on color monitors ("Looking Through the Mac II Kaleidoscope"), you were both excited and depressed. Excited at the thought of having a 1024-by-768 display that supports 256 colors simultaneously. Depressed at the realization that you could buy a new car for the same amount of cash. (True, it



The Big Picture

E-Machines' monochrome model offers a small footprint but plenty of dots. The trade-off is that characters appear slightly smaller than on a Mac SE.

would be a low-end foreign import, probably from Korea or Eastern Europe, but we're still talking about a real, live, turn-the-key-and-drive-off-into-the-sunset car.) A 1024-by-768 monochrome display is a whole lot cheaper and gives you the same working area that a color monitor does.

Another reason for choosing mono is that some of the software currently running on the Mac works best with a monochrome (1-bit-per-pixel) display. Most of that software is changing to accommodate multiple bits per pixel, but programs written originally for the smaller Macs often work better on monochrome displays.

Besides, you can comfort yourself with the fact that monochrome displays update far faster than do gray-scale or color displays. Text scrolls faster, screens redraw faster, and games respond faster.

Why Choose Gray-Scale?

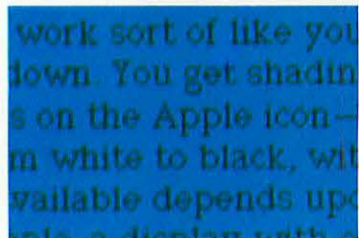
Because it's cheaper than color, but gives you the shading that monochrome doesn't. This can be critical in such application areas as desktop publishing, engineering (CAD/CAM), drafting, and image processing. After all, since your laser printer (probably) doesn't produce color output, why do you need a color display, anyway?

Why Choose Color?

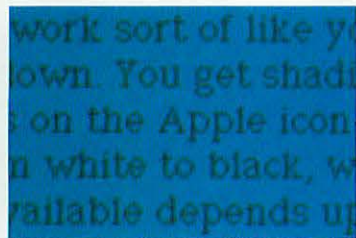
One of three reasons: you have money to burn; you can talk someone else into paying for it; or your application really, really must have color and can't get by with just a gray-scale display. A fourth reason: so you

Monochrome

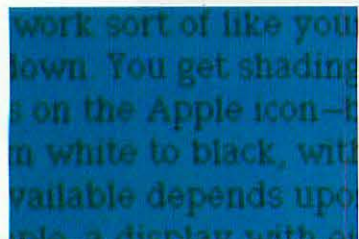
Gray-Scale



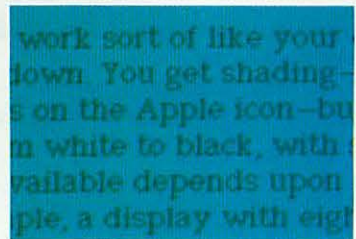
Radius Full Page Display



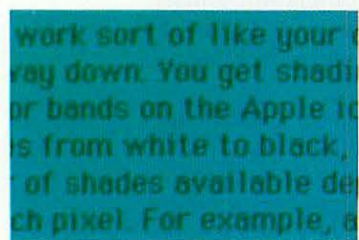
Moniterm Viking



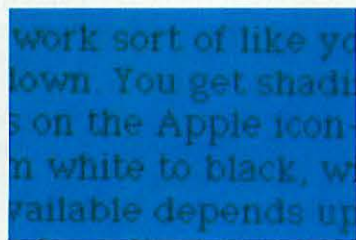
MegaScreen 2001



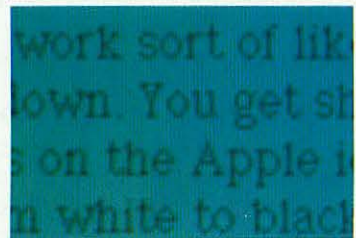
The Big Picture IQ



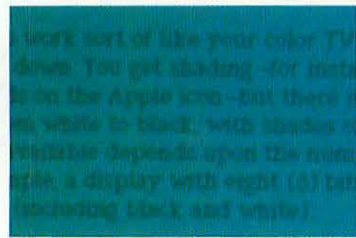
The Big Picture



Sigma Designs LaserView
(standard)



Sigma Designs LaserView
(high resolution)



Apple High-Resolution Monochrome

can gloat over it. But this article isn't about color displays, so we won't explore these reasons in detail.

Now, let's look at the different monochrome and gray-scale monitors.

Viking

Okay, I've switched to the Moniterm Viking gray-scale display to write this portion of the article. The Viking is, frankly, the nicest of the displays I've looked at. It offers a full set of 256 shades of gray, has lots of space, and is easy on the eyes. The dot pitch (number of pixels per inch) is the same as on the Apple monitors, so there's no sense of shrinking images.

There are a couple of reasons why the Viking is so nice to work on. First, the screen has a built-in filter that virtually eliminates glare. On most of the other screens I can catch some faint (or not so faint) ghost of myself and my surroundings reflecting off the monitor. On this one I don't see a thing, at least not in my normal working position. If I bend forward and lean to one side, I can see a reflection of the sky coming through the window to my left, but since I usually don't work with my face resting on the table, it's not a problem.

The other reason is the phosphor used, which produces a pleasant shade of gray, darker than some of the other displays. That, combined with the filter, makes the display seem almost too dark—but I suspect that's because I'm used to a brighter, more glaring screen.

The only video defect I found in the display was a slight bowing inward along the middle of the right edge. Also, the curvature of the tube itself makes it look as if the corners of the display recede from the center. Neither effect was overly distracting; both were probably noticeable only to a picky reviewer like me.

The 1024-by-768 (horizontal by vertical) display has the same resolution as the Sony 19-inch color monitor I've been using, but the Viking monitor is much smaller and lighter. You have lots of screen space to work with, though not as much as some of the other monitors offer. On the other hand, as mentioned, the dot pitch is identical to Apple's, so readability is enhanced.

Full Page Display

The Radius Full Page Display (FPD) for the Mac II packs a lot of features into a small package. The monitor is small, with a footprint only 11 inches wide and 14 inches deep. The screen itself, with a resolution of 640 by 864, is oriented toward displaying one single page of text. And the video card itself is small.

Visually, the Radius is easy to use. You have a wide range of brightness settings. The dot pitch is slightly smaller than standard, though not uncomfortably so. There was no noticeable flicker, and the contrast was easy on the eyes.

The Radius FPD comes with some extras to expand its usefulness. The disk accompanying it has two Init files that you drop into the System Folder. These

Dealing with Multiple Monitors

After years of working on a regular 512-by-342 Mac display, I feel somewhat giddy with five large-screen monitors up and running simultaneously. With the LaserView in high-resolution mode, this configuration—consisting of the Radius Full Page display (in wide-screen mode), the LaserView, the MegaScreen 2001, the Big Picture (monochrome), and the Viking—has a total display space of roughly 5 million pixels, the equivalent of 28 regular Macintosh screens or 16 of the Apple Mac II monitors. As wonderful as this all sounds, though, there are some problems and considerations in having several monitors hooked up to a Mac II.

First, trying to lay out the relative screen positions can be a real pain, especially with five monitors and especially if you're trying to get their virtual positions to correspond to

their physical positions. I do have to congratulate Apple for its amazing vision, however. Here I had always thought that the Puzzle desk accessory that came with the original Macintosh was a mere whim, an idle expression of playfulness on the part of the Mac design team. It was actually a clever training device to help users develop the skills needed for shifting screens around. Patience, persistence, and forethought are required to maneuver those screens into the desired configuration. A hint: when you run out of maneuvering room, click on one of the other control panel icons (such as Keyboard or Mouse), then click back on Monitors. The icons representing the display screens will now be recentered, and you'll have more room to work with.

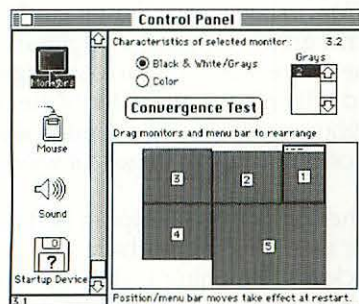
Second, many applications limit the size of a window to the size of the start-up screen. This means, for example, that if your start-up screen is an Apple monitor (640 by 480), and you have a Radius FPD as your second screen, you cannot resize the document to take up the full screen on the FPD. Applications with this limitation include Microsoft Word 3.0 and ReadySetGo 3. On the other hand, Excel 1.04 lets you make a spreadsheet as large as you want; with the configuration above, I was able to open up a spreadsheet to 35 (standard-width) columns by 124 rows—over 4000 cells visible at once. We can all hope, of course, that the other manufacturers get their acts together.

Third, it's easy to lose the cursor. Seriously. Every so often, I find myself madly scrolling the mouse in different directions trying to find the cursor. In fact, I ended up doing it in the middle of writing that last sentence, while pausing to demonstrate the wide-screen option on the Radius FPD for my wife.

Fourth, these monitors are *big*. Not as big as the color monitors, but they do consume room. The biggest challenge I had was getting all five close enough to the Mac II so that their video cables would reach.

Fifth, what are you going to do with all those monitors, anyway? I can see a possible training environment, with each student or group of students sitting around a monitor. I can also see some kind of simulation station, with the different screens being used for different displays. But for single-user work, I've found that two screens (one larger, one smaller) are about all that I can make real use of.

Still and all, I find it amazing that, without reading any instructions, I could plug in video cards from five different manufacturers, hook up the corresponding monitors, start up, and have the system up and running with all five monitors available—with those five monitors automatically forming one large workspace. And for all my grumbling, the total configuration time was less than five minutes. I don't know of any other system anywhere with that flexibility.



Juggling Screens

Configuring five screens takes a bit of patience and skill. After selecting the monitor option in the Control Panel, you can create one large screen by sliding the monitor boxes into position. In this figure, screen 1 is where the menu bar appears. The remaining four screens are extensions of the main screen.

Monitor Features Compared

Manufacturer	Model	Type Resolutions	Shades	Size	Horizontal Density
Moniterm	Viking	gray-scale 1024 × 768	256	19"	72 dpi
Radius	Full Page Display	monochrome 640 × 864	2	15"	78 dpi
MegaGraphics	MegaScreen 2001	monochrome 1024 × 900	2	19"	75 dpi
Sigma Designs	LaserView Display	gray-scale 832 × 600 or 1664 × 1200	2 or 4	19"	63 dpi/125 dpi
E-Machines	The Big Picture	monochrome 1024 × 808	2	15"	85 dpi
E-Machines	The Big Picture IQ	gray-scale 1024 × 808	256	15"	85 dpi
Apple	Hi-Res Monochrome	gray-scale 640 × 480	2, 4, 16, 256	11"	72 dpi

create a Radius FPD module in the Control Panel that gives you three important features.

First, there's a screen saver you can set to any specific number of minutes and seconds. If the specified time elapses without any user activity, all screens attached to your Mac II go black, after which stars slowly come out (as if at night), with an occasional shooting star streaking by. A key press, mouse click, or mouse movement restores all the screens.

Second, if you're using the FPD as your main screen (with menu bar), you can ask to have a larger-than-normal (16-point as opposed to 12-point) menu bar and menus.

Third, you can change the Radius FPD to have a virtual resolution of 1024 by 864. The visible resolution remains the same; however, when you move the mouse to either edge, the display quickly scrolls. This may sound inconvenient, but it works well and gives you a large screen in a small space. And it works fine if you have multiple monitors; the Radius display scrolls until you reach the virtual edge, then the cursor passes through to the adjacent display.

The Radius FPD system that I received had some visual defects. About 1 pixel's worth of ghosting occurred along the left edge of the screen and along the right edge of windows. Also, the top corners of the display showed noticeable distortion; lesser distortion was also visible at the bottom corners.

The Radius FPD is a good choice if you have limited space for a monitor; for example, it would work well in an office where you had the Mac II system unit on the floor and just the keyboard and monitor on your desk. And the virtual screen option helps to offset the limited display size.

The Big Picture

E-Machines has two versions of The Big Picture display system out. One is monochrome; the other, The Big Picture IQ, is gray scale. Resolution is 1024 by 808; however, since this is on a 15-inch monitor, that puts the dot pitch at 90 dots per inch (dpi), so text is noticeably smaller than on a regular Mac display (though not by much—about 10 percent). The Big Picture IQ offers a choice of either monochrome or 256 shades of gray, selectable via Monitors in the Control Panel.

Visually, The Big Picture is generally good but has some deficiencies. There was some slight bowing at the top and along the left side, though not as much as in a few of the other monitors. The brightness knob is on the front (Apple was the only other monitor with one on the front), so you can adjust it easily. Contrast was not all that great; turning the brightness knob up, I could see the entire scan area surrounding the Mac desktop. And I did not like the color of the phosphor; with the brightness adjusted to a comfortable level, the screen took on a gray-green tinge that wasn't very restful.

While the Big Picture's footprint isn't much smaller than other monitors', it does have an asset in this area. The back of the monitor is shifted to the left, leaving a rectangular notch 5 inches wide by 7½ inches deep on the right side in the back. If you stick the front left corner of your Mac II there, you cut down on the overall footprint of your system. Of course, you could just put the monitor on top of the Mac II and eliminate the footprint issue altogether, but that's true of any of the monitors.

I had two other problems with The Big Pictures. First, the video cable on the monochrome version was only 18 inches long, forcing me to keep the monitor right next to (or on top of) the Mac II. Second, I wasn't able to get the Big Picture IQ system running with four other monitors. Despite repeated reconfiguration, the Mac II would always hang during start-up. I was able to get the Big Picture IQ running with more than one other monitor, though. (I have it and the Radius up and running as I type this.)

Vertical Density	Footprint	List Price
72 dpi	17.5" × 14"	\$2695
78 dpi	11" × 14"	\$1995
75 dpi	17.8" × 14"	\$1995
55 dpi/115 dpi	17.5" × 14"	\$2395
85 dpi	16" × 13.5"	\$1995
85 dpi	16" × 13.5"	\$2895
72 dpi	12" × 14.5"	\$399

MegaScreen 2001

The MegaScreen 2001 from MegaGraphics has the highest resolution of any of the displays offering dot pitch close to Macintosh standards. The resolution is 1024 (horizontal) by 900 (vertical); the dot pitch is 75 dpi, slightly denser than the Mac but not noticeably so. Those extra few vertical pixels pay off, too: you can display a complete page on the screen under Ready-SetGo 3 and still have the menu bar visible. The display itself is monochrome.

The MegaScreen 2001 has a clear, crisp image, though the unit I received had a few distortions: the left side bowed in slightly, the upper-left corner bowed up, and there was a slight loss of focus along the right edge. Brightness and contrast are both easy on the eyes, though I was unable to find any brightness control.

All in all the MegaScreen 2001 does the job well, has lots and lots of room (only the LaserView, in high-resolution mode, has a greater resolution), gives a sharp image, and is easy on the eyes.

LaserView Display System

I'm writing this section, as you might expect, on the LaserView monitor from Sigma Designs. It's in high-resolution mode right now, with some 75 lines of 12-point New York font visible at once, and the regular page-width window takes up about a third of the screen. If you're looking for maximum space on a single monitor, this is the place. Be prepared to squint a little, though.

The LaserView Display System consists of a video board and a 19-inch gray-scale monitor. It supports two resolutions: standard, which is 832 by 600; and high, which is 1664 by 1200. Under high resolution you can put very large documents, spreadsheets, and other images up on the screen. And under standard resolution, you can still fit more on the screen than on a regular Apple video monitor.

A LaserView module in the Control Panel lets you switch resolutions, adjust the size of the system cursors (arrow, watch, I-beam, cross), adjust the size of the system font, and set a time limit (5 minutes, 10 minutes, 20 minutes, or never) for automatic screen blanking. Note, however, that screen blanking affects only the LaserView display if you have multiple monitors.

In high-resolution mode, the LaserView fits the equivalent of 11.4 regular Macintosh screens (or 6.5 Apple video monitors) onto one display. Needless to say, you can fit a lot of documents onto the screen at once. The only drawbacks to the display are that the text is very tiny, and the focus is a bit blurred towards the edges. The Macintosh Operating System doesn't help; if you're opening a lot of folders, you can run up against the system limit on opened windows long before you use up your display space.

If the high-resolution mode requires visual acuity, standard resolution is a boon for the visually impaired. Putting an 832-by-600 image onto a 19-inch monitor yields a "larger than life" display that's easy to read and makes fine work a snap. There is a slight blurring toward either edge, but it has no effect on legibility. And you're still working with a display that has greater resolution than either the regular Mac display or the Apple video monitors for the Mac II.

Both resolutions support monochrome and four-level gray scale. You switch using Monitors in the Control Panel, just as you do for other monitors that support multiple gray-scale or color settings.

The LaserView display system comes with a disk containing three files. One is an Init file that you place in the System Folder; this creates the LaserView panel in the Control Panel. Another is the LaserView 12-point font, which replaces Chicago 12-point as the system font if you ask for the large system font. The last is a diagnostics program that checks the memory on the LaserView video card and puts up a number of images and patterns on the display to test it out.

While it is possible to switch resolutions using the LaserView, there are some considerations. If you start up in high-resolution mode, then switch to standard resolution, everything outside of the upper-left quadrant of the high-res display becomes inaccessible—disk icons, the Trash Can, windows, documents, and so on—until you go back into high resolution. In a similar fashion, if you boot up under standard resolution, then switch to high resolution, the disk icons and Trash Can stay in the upper-left quadrant. You can, of course, pick them up and move them to the right, but if you then switch back to standard resolution, they're inaccessible until you go back to high resolution. What's more, some applications, if opened under standard resolution, won't let you resize the document

window beyond the limits of the standard-resolution display (though you usually can move it around the high-resolution display with no problem). Also, if you plan to do any switching and you have multiple monitors, be sure that you don't have monitors positioned (in the Monitors section of the Control Panel) to the right of or below the LaserView. (The Radius avoids this problem by requiring a restart for the wide-screen/narrow-screen option to take effect.)

One other bug—really a lack of functionality—showed up with a public domain utility I used. It's an Init program named MFMenu (from IMI Software) that



If I had to pick just one monitor to have with a Mac II, it would be the Moniterm Viking.

creates a pop-up menu to select among applications running under MultiFinder. You make the menu appear by clicking on the right end of the menu bar, just past the application icon. I was unable to get MFMenu to work with the LaserView system as the main screen, though it worked with all the other monitors, even with the LaserView as another menu.

Well, you didn't think it was going to be easy switching between resolutions on the fly, did you? Even given the minor hurdles above, it's something of a tribute to both Sigma Designs and Apple that I can configure a system with five monitors and then switch resolutions on one of them.

Apple High-Resolution Monochrome Monitor

To write this section, I've switched to the Apple monitor, menu bar and all. After all those other monitors, I feel very cramped. I can get only 28 lines of 12-point New York font in my Microsoft Word window, and a normal page-width window takes up 80 percent of the screen. A 640-by-480 resolution is quite a come-down, and on an 11-inch screen at that.

On the other hand, this is the nicest monitor visually. There is no bowing along any side, and just a hint of defocusing at the edges, visible only through a magnifying glass. What's more, this is the only monitor that has both brightness and contrast controls; the others had only brightness controls (one of them didn't even have that).

The footprint on this monitor is quite different from the others: 12 inches wide by 14½ inches deep. The monitor is almost too low to sit by itself on a desk;

it really needs a monitor stand (which Apple sells), or it needs to sit on top of the Mac II itself.

This monitor, with the Apple video card, also offers the greatest variety of gray shades. With full memory installed on the card, you can have 2, 4, 16, or 256 shades of gray. And if you're on a stringent budget, you can get the card without the extra memory and still have 2, 4, or 16 shades of gray.

Conclusions

I've now switched back to a Sony 19-inch color monitor, and the lack of crispness (compared to the monitors above) is noticeable. Don't get me wrong—the Sony display is very nice, it just isn't as sharp as the monochromes. On the other hand, the little Apple icon is now in color again.

Price considerations aside, my first choice—if I had to pick just one monitor to have with a Mac II—would be the Moniterm Viking. The display is easy on the eyes, glare is nonexistent, it has 256 gray scales, and it is the only monitor to offer exact Macintosh density. It would also be my first choice as a second monitor, if I already had the Apple monochrome monitor.

If I approached the monitor question as a power user, I would probably select the LaserView Display System. I might squint and hunch over a lot, and have to work around a few glitches, but I could have more applications up and clearly visible than on any other screen.

If the extra resolution is important, and gray scales aren't, then the MegaScreen 2001 is a good alternative to the Moniterm Viking. And it's cheaper, too.

If I were going to pick two monitors, I'd probably pick one of the above, and then the Radius Full Page Display. The Radius would make a great second monitor to the LaserView, since you could open documents to full size and see them a lot more clearly than on the LaserView itself.

On a tight budget? Well, the Apple monitor is sharp, cheap, and versatile. And you can plug any number of RGB monitors into the same video card (see "Looking Through the Mac II Kaleidoscope," *Macworld*, December 1987).

I'd like to give a recommendation of some kind to the Big Picture systems, but they had the most visual defects and the display itself was very tiring on the eyes.

Ultimately, of course, the decision is yours. You know what you like best, you know what you need, you know what you can afford. And the bottom line is this: there's a variety of monitors to choose from, and more coming on the market all the time. □

See *Where to Buy* for contact information.

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Sessions will include:

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Developers who attended last year's Technology and Issues Conference demanded another chance to get together and thrash out the important issues facing the Macintosh development community. So Macworld is pleased to announce the second annual Technology and Issues Conference in San Francisco, June 1 through 3, 1988.

This gathering brings together third-party Mac hardware and software developers for intense discussions of technical issues. Leading Macintosh developers will speak on their areas of expertise in sessions that include plenty of time for give and take. The Technology and Issues sessions and informal discussions will provide a unique opportunity to influence standards, shape technological developments, and hear from Apple representatives.

To make sure that the sessions remain small enough for productive discussion, space is limited. Please register early to avoid disappointment. For registrations received before April 6, the fee will be \$495. After April 6, the registration fee will be \$595.

Yes, I'm interested in attending the Macworld Technology and Issues Conference in San Francisco. Please send registration details.

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Send to: Technology and Issues Conference, *Macworld* Editorial, 501 Second St., San Francisco, CA 94107

Build Your First HyperCard Application

by Franklin Tessler

I'll bet many Macintosh users have thought of terrific applications, but have let their ideas wither on the vine because they lacked the time or skill necessary to transform the concepts into working programs. HyperCard and its built-in language, HyperTalk, have rejuvenated many people's interest in programming. Look on any bulletin board system today and you'll find long lists of public domain and shareware stacks; many of these applications would have taken months (or years) to write using other, earlier languages. By making programming accessible to more users, HyperCard has tapped into a fresh pool of creative talent.

For some, though, the product has proved frustrating. Although you can do a lot in HyperCard without any programming, its real potential lies in HyperTalk. And while HyperTalk's syntax is very English-like, it still uses many of the concepts of traditional programming languages like BASIC and Pascal. So how do you learn HyperTalk? Certainly not from Apple's manual: it barely touches on the subject. Danny Goodman's book *The Complete HyperCard Handbook* (Bantam Books, 1987)

does an excellent job of describing HyperCard and HyperTalk, but it doesn't give a sense of where to start in developing a HyperCard application. So I suspect that some people don't progress much beyond experimenting with some basic HyperCard functions; they never go on to write a complete application.

How to Begin

This article offers the guidance you need to begin building rudimentary HyperCard applications. I'll assume that you're already familiar with basic HyperCard concepts and that you've played around with the message box a bit. As an example, I'll show you how to design a simple application called Form Editor that lets you select, modify, and print form letters that have already been created in a word processing program and saved as text files. This HyperCard application is not something you should expect to make productive use of; it is intended only as an exercise to help you learn how to build your own applications. To get the most out of this tutorial, you should actually work through the steps yourself.

Novice HyperTalk programmers should be aware of two pitfalls. First, don't get caught up in trying to make stacks that

look nice—forget about the paint tools until you've mastered the essentials and proven that your programs actually work as you want them to. Second, don't worry if your programs aren't as elegant or compact as they might be. Because HyperTalk is so modular, you can write an application in rough pieces and fine-tune it later.

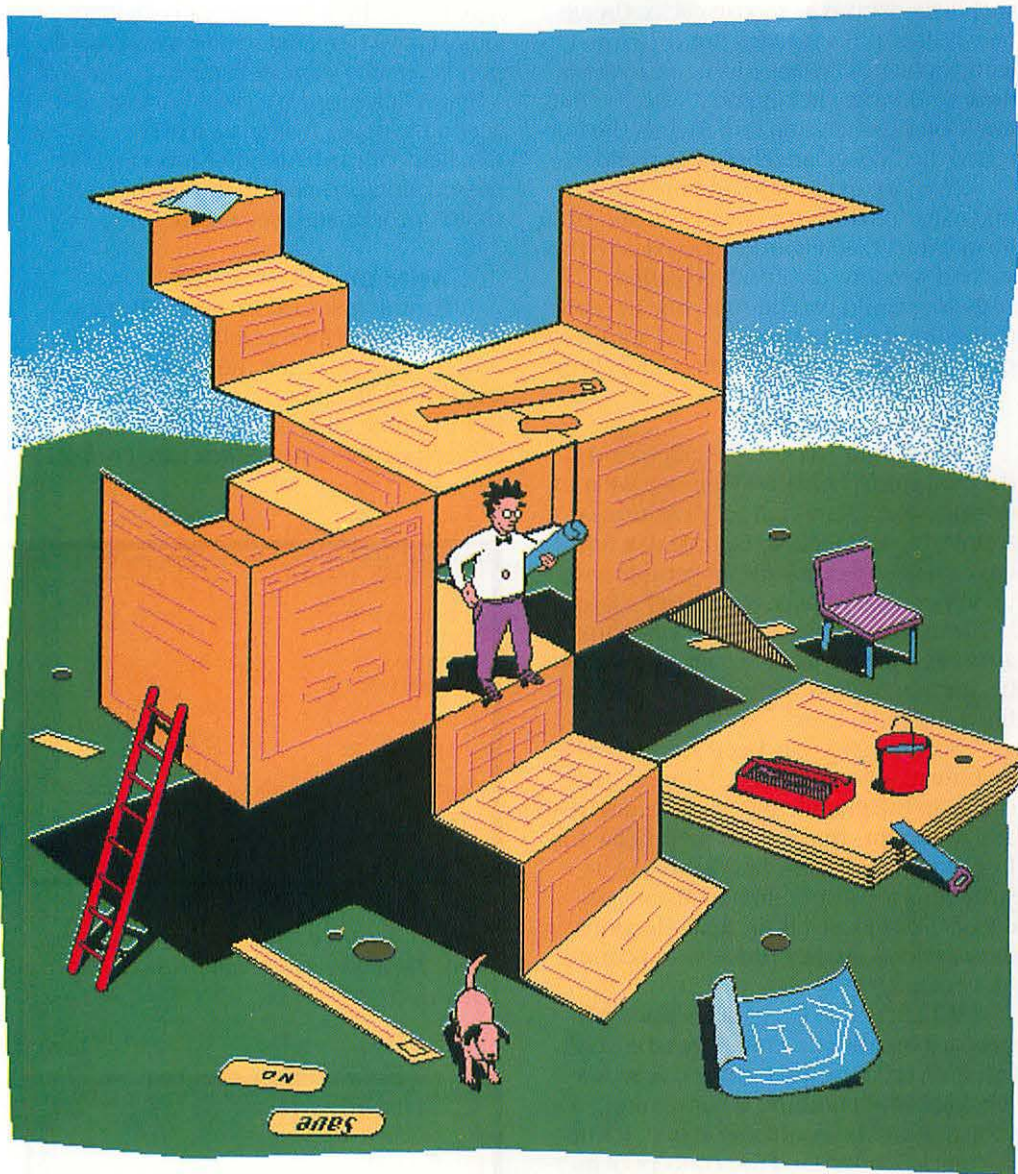
One final caveat: when opening, reading, writing, closing, and printing files, HyperCard is fussy about the exact position of files within the Hierarchical File System (HFS). You will probably have to modify the scripts in this article and add pathways (the sequence of folders the program must open to find a file) to make the stack work properly on your system.

Plan the Application

As with any complex task, time spent doing some careful thinking and planning at the outset will streamline the work of writing a HyperCard application. Although there aren't any hard and fast rules, it's useful to have a set of guidelines on which to base your work. The best way to plan is to forget all about HyperCard for a moment and imagine how you want the application to work. It may help to sketch your ideas on paper.

First, break down the application into specific functions and write these down on paper. By *functions* I mean individual

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A strategy for HyperCard beginners

Call the stack **Form Editor**. Before saving, make sure that the box for copying the current background is not checked; otherwise the new card's background will be identical to the stack currently open.

The screen should now display a blank card that will serve as the application's first window. Choose "Card Info..." from the Objects menu and enter the name **ListCard**. Click OK, and then add a second card to the stack by selecting New Card under Edit. Call it **EditCard**. Return to the first card by pressing ⌘-2.

tasks like opening a file, manipulating data, and printing. For a simple application like Form Editor, the list of functions has only three items.

Group Related Tasks

The next step in the planning process is to group similar functions and assign them to windows. In most Macintosh programs, related actions take place in separate windows. For instance, in a home finance application you might enter check transactions in one window and reconcile accounts in another. Go down the list of functions you created earlier and arrange them so that the application user will be able to complete as many steps as possible in a single window. It might help to sketch a flow chart showing the interrelationships between functions and the sequence in which they will probably be enacted.

Create the Cards

The next step is to translate this conceptual design into a HyperCard stack. Based on what we found by collecting tasks into logical groups, the best design for this form letter application will require two windows. In HyperCard terminology, windows are *cards*. (One of HyperCard's limitations is its inability to deal with more than one Macintosh window at a time.)

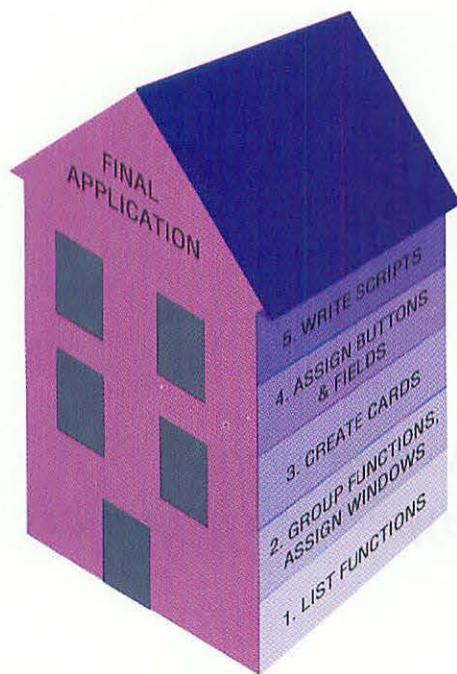
Since our design dictates two windows, we need a stack with two cards, one for selecting the appropriate form letter and another for editing and printing. So let's begin the process of constructing an application by launching HyperCard and selecting New Stack from the file menu.

Create Fields and Buttons

Once you've created the necessary cards, you must add the components that will make each card work. You do this by translating each function in your paper design into the appropriate HyperCard feature.

HyperCard must handle all of an application's tasks with three types of features: fields, buttons, and graphics. Examine each window critically, and translate each design function into the appropriate HyperCard feature using the following guidelines:

- Some items contain text that users must edit. Represent these tasks with HyperCard's fields.
- Some items don't require data entry but permit users to initiate actions. In HyperCard, such actions correspond to but-



Five-Step Strategy

Using HyperCard as the foundation, you can build finished applications by following this sequence of five steps.

tons—active regions in the window that respond to user actions like mouse clicks.

■ A window may also contain graphics that add visual punch but don't change at all—window dressing. As I've said, leave the creation of graphics for last.

The first card in this application lists form letters available to the user. To create the list, choose New Field from the Objects menu and resize the field so that it fills most of the card, leaving some room at the bottom. Next, pick up the field tool, double-click anywhere in the field to bring up its attributes box, and enter the field's name (**ListField**), font, size, and style. Just in case the list of form letters grows longer than the field size, make the field scrollable by clicking on the appropriate radio button (see Figure 1). Finish by entering the list of names into the field (see Figure 2).

Although there's always an easy way back to HyperCard's Home stack via the \mathbb{H} -H shortcut, you can build a more elegant escape hatch into an application by adding a button. In contrast to a field, a HyperCard button's only job is to respond to

such user actions as mouse clicks. Create a new button (choose New Button in the Objects menu) and change its name to **Return Home** by double-clicking on it with the button tool. Use the same tool to drag the button to the unused area below ListField.

Now, we're ready to prepare the second card, in which users will edit and print form letters (see Figure 3). Go back to the second window: create a field called **EditField** and add two buttons, one to return to the list of names (Return) and another to print the letter after it's been edited (Print).

Writing Scripts

Scripts are HyperCard's lifeblood—they tell cards, fields, and buttons what to do and when. Although scriptwriting isn't simple, HyperTalk is so flexible that it's easy to experiment without getting caught up in details of syntax. It's crucial not to become too concerned that your scripts aren't as compact or elegant as they could be. Just get them working first—you can fine-tune them later.

So far, we've only been working with inanimate objects—fields, buttons, and cards. To breathe life into them you have to add the scripts that control their behavior. In general, think of scripts as sets of instructions for responding to Macintosh events like mouse clicks, text selections, menu selections, key presses, and cursor movements.

Whenever an event takes place, HyperCard broadcasts a message to anyone listening (HyperCard even sends an **idle** message when nothing is happening). Although it can be confusing at first, it's important to understand the concept of mes-

sage hierarchy: a message can originate almost anywhere, but where it ends up depends on who's listening for it. The role of a HyperTalk script is to wait for, trap, and act on messages that relate to a specific button, field, or card. All other messages are passed along, routed up through a kind of chain of command (see Figure 4).

Write Your First Script

For the first card in our application, we'll need a script that tells the ListField how to respond when the user chooses a form letter. To enter the script, select ListField, double-click on it, and click on Script to bring up the script editor (see Listing 1).

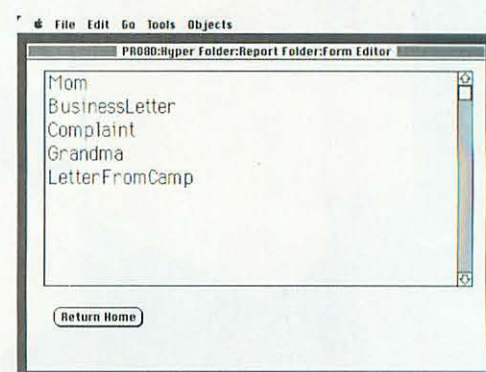


Figure 2

The first card in the stack displays a list of form letters. The Return Home button exits to the Home card.

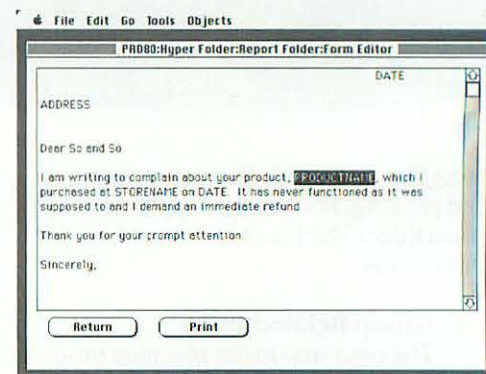


Figure 3

The stack's second card presents a form letter for editing. The two buttons handle returning to the first card and printing.

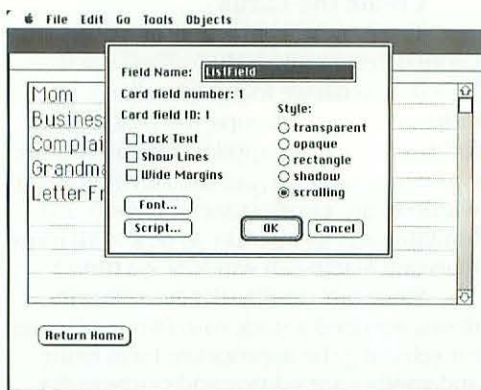


Figure 1

This dialog box lets you change the field's attributes, including its font and whether or not it includes a scroll bar.

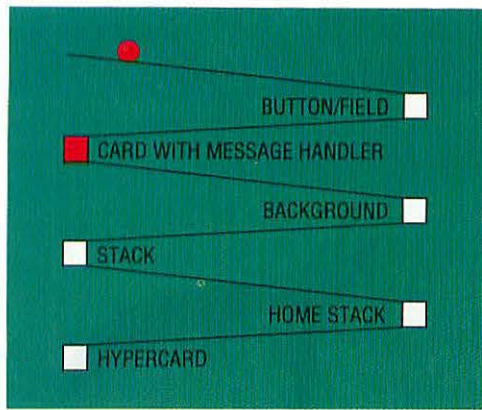


Figure 4

Scripts work by trapping messages that HyperCard broadcasts through a hierarchy of objects. In the illustration, the message (represented by a marble) will first check to see if any scripts are attached to the field or button. If not, the message passes on the each subsequent step until it finds a matching handler or returns control to HyperCard. This message will be trapped by a script attached to the card's background.

As you type, notice how HyperCard automatically formats the script to make it easier to follow.

Your first challenge is to get HyperCard to recognize that the cursor has entered the field and selected a name by double-clicking on it. Fortunately, HyperCard sends a **mouseWithin** message whenever the cursor is inside a card, field, or button: the first line tells HyperCard to follow the script's commands whenever the field receives a **mouseWithin** message.

The second line tells HyperCard to exit the script if no text has been selected. Otherwise the selection is placed in a variable called **filename**. (The file name must be prefixed with the correct pathway to the file in the Macintosh filing system.) Variables are temporary receptacles for data and can be created on the fly as needed. The **if...then...else...** sequence is an example of a control structure, a powerful way of making HyperTalk take action (in this case, follow a pathway) only when certain conditions have been met.

To retrieve the appropriate form letter, assume that each one is stored in a separate text file with the same name as the one in the list. The next part of the script opens the variable **filename** and reads its contents

into another variable called **lettertext**. Here the script makes use of another HyperTalk control mechanism, the **repeat loop**: the commands between **repeat** and **end repeat** continue to cycle until the specified conditions have been satisfied. In this case, the script reads the file in large gulps, 16,384 characters at a time, and dumps them into a special HyperTalk variable called **it**. As long as there's more text to read, **it** isn't empty, so HyperCard tacks the most recent chunk of text onto the variable **lettertext** and goes back for more. At the end of the loop, **lettertext** contains all the text in the file.

The script ends by closing the file and transferring to the second card, **EditCard**. The contents of **lettertext** are then placed into the field **EditField**. The last line in the script informs HyperCard that the sequence of commands is finished.

More Scripts

The script for the Return Home button is simpler (see Listing 2). Since buttons usually respond to being clicked, the button needs to know exactly when the mouse has been released with the cursor

The only remaining tasks are to write scripts for the two buttons on the editing card. The first button's script takes the user to **EditCard** (see Listing 3). The Print button's script needs a bit more explanation. Although HyperCard has some printing capabilities, it's sometimes preferable to handle printing tasks through another application, such as a word processor. The print script saves the edited form letter in a text file called **PrintFile** and then prints that file using **MacWrite** (see Listing 4). When printing is done, HyperCard automatically starts up again and returns to where it was.

Further Explorations

It should be obvious that as the application stands, it doesn't do much. For practice, you might want to expand on it. Try adding a feature or two of your own, such as inserting the date into the form letter. The goal is not to write a useful program, but to get a feel for constructing an application and working with it. You might also find it instructive to take a familiar piece of software and consider how you might emulate it in HyperCard.

Listing 1

```
on mouseWithin
  if the selection is empty then exit mouseWithin
  else
    put "Hard Disk:" & the selection into filename
    open file filename
    repeat
      read from file filename for 16384
      if it is empty then exit repeat
      put it after lettertext
    end repeat
    close file filename
    go to card "EditCard"
    put lettertext into card field "EditField"
  end if
end mouseWithin
```

Listing 2

```
on mouseUp
  go home
end mouseUp
```

Listing 3

```
on mouseUp
  go to card "ListCard"
end mouseUp
```

Listing 4

```
on mouseUp
  open file "Hard Disk:" & "PrintFile"
  write card field "EditField" to file "Hard Disk:" &
    "PrintFile"
  close file "Hard Disk:" & "PrintFile"
  print "Hard Disk:" & "PrintFile" with MacWrite
end mouseUp
```

over it. This situation is neatly handled by having the button's script look for a **mouseUp** message; to make things easier, HyperCard automatically puts **on mouseUp** and **end mouseUp** commands at the beginning and end of every button script. The other line is a single **go home** command telling HyperCard to return to the Home card when you click on the button.

Another way to improve your skills is to dissect other people's scripts and modify them—many user groups and bulletin boards have more public domain stacks than they know what to do with. As you write new scripts, examine them critically to see if you can improve them by shaving off a few lines here or there, or by adding new functions. Above all, don't be afraid to experiment and share your ideas with others. □

See *Where to Buy* for contact information.

Installing Memory



*How to install
extra memory on
a Mac Plus
or a Mac SE*

Mucho memory. Is it a silly fashion craze? Smart Macs everywhere are sporting more memory this year, and for good reason. With the advent of MultiFinder, keeping multiple applications in memory is now de rigueur. Most business, desktop publishing, and graphics programs require hundreds of kilobytes of memory each. And this year also gave rise to the software equivalent of big and tall clothing, HyperCard and 4th Dimension, each requiring 700K under MultiFinder. These programs may be a portent of next year's fashion in memory demands.

Fortunately, it's easy to expand the memory capacity of a Mac Plus or Mac SE from 1 megabyte to as much as 4. All it takes is several hundred dollars. Memory has become a real commodity, with new brands appearing regularly and prices changing frequently.

Whenever memory upgrades are discussed, one question inevitably arises: how easy is it to do it yourself? The answer is that a number of experienced Mac users have succeeded in upgrading their own Mac Plus or SE memories without mishap. That's *not* to say you should attempt a memory upgrade yourself. In fact, it's inadvisable for a number of reasons.

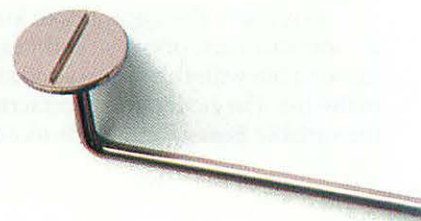
Performing your own upgrade exposes you to the risk of serious—even life-threatening—electrical shock, especially



by Lon Poole

when the machine is plugged in, but even when it isn't. The economic advantages of doing it yourself are dubious. For example, you'll need at least \$30 to \$50 worth of tools you probably don't already have and may not need after using them once. Then there's also the risk of breaking delicate internal parts that are expensive to replace. More than a few veteran Mac case crackers have broken a picture tube or two. You can also ruin memory chips or other logic-board components by exposing them to small charges of static electricity.

Apple advises that all memory upgrades be performed by authorized dealers and warns that you will abrogate the warranty if you upgrade your machine yourself. This means that you'll be covering the full cost of any mishap if you do your own upgrade. Weigh all that against the cost of having an experienced technician do the work and assume the liability. You'll pay \$25 to \$50 for labor and incur shipping or transportation costs. True, if you do it yourself, you will not lose the use of your



Lon Poole is a Macworld contributing editor who has been educating Macintosh users since the machine was introduced.

But remember—if you insist on doing the upgrade yourself, you're on your own. *Macworld* does not endorse any of the upgrade packages mentioned here, and assumes no liability for property damage or personal injury that may result from performing your own upgrade. Hopefully, after seeing how it's done, you won't feel the urge to do it yourself.

Choosing Memory

A standard Mac Plus or Mac SE has 1MB of memory on four Single Inline Memory Modules (SIMMs). These SIMMs are pieces of plastic about 3½ inches long by ⅝ inch high. Each module has eight memory chips across its face and metal connectors along one edge. The SIMMs snap into special sockets on a Mac Plus or Mac SE logic board and are easily replaced with higher-capacity memory. Various memory upgrade products make it possible to increase memory in a Mac Plus or Mac SE from 1MB to 2MB, 2.5MB, or 4MB. The memory upgrades can take several forms, including regular SIMMs, long memory modules, and adapter cards.

When deciding which type of upgrade to buy, keep several factors in mind. Cost is certainly important. Be sure to shop around before making a purchase. Think twice, though, about an upgrade that saves you \$50 or \$75 but forces you to listen to a cooling fan you can't stand, or makes adding a big screen or another upgrade impossible later on. Try to get memory that you can take with you when you advance to a new Mac. And don't pick something that obviates future memory expansion, unless you're very sure you'll never want more memory. Just two years ago having 1MB seemed incredibly luxurious. Today it's merely adequate.

SIMM Swaps

The 256K SIMMs that come with a Mac can be replaced in pairs with 1MB SIMMs of about the same size. Replacing one pair yields 2.5MB and leaves two of the original 256K SIMMs unused. Replacing all the SIMMs yields 4MB, with all four original 256K SIMMs left over. Note that you could remove all four 256K SIMMs and install only two 1MB SIMMs, leaving all four original 256K SIMMs unused and two SIMM sockets empty. It makes no sense to do that, though. You might as well use two of the 256K SIMMs you already own.



A SIMM may have either of two styles of memory chips. The new-style memory chips, called surface mount, are smaller than the old style, called DIP (Dual In-line Package). SIMMs with DIP chips may be a bit cheaper; however, their bulk can make it impossible to add an expansion card to a Mac SE.

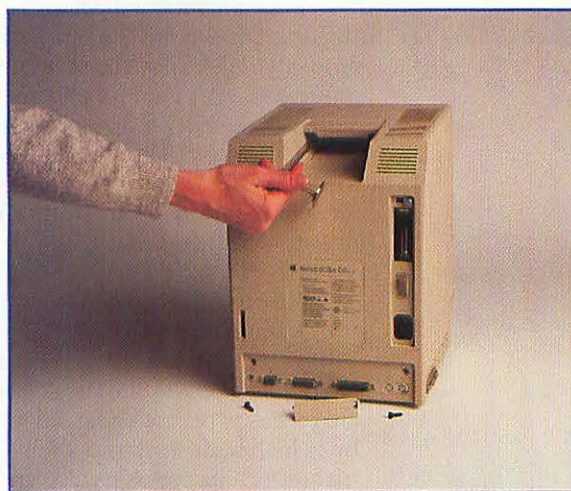
The SIMMs you buy for a Mac Plus can be used on a Mac SE. If you buy SIMMs that have 120-nanosecond memory chips (not 150-nanosecond chips), they will work on a Mac II as well.

Several companies make 1MB SIMMs. For example, Apple's 2MB Memory Expansion Kit, Dove Computer's MacSnap 2S, and



Mac while it is in the shop. (Assuming the operation goes smoothly.) But the procedure takes time—figure half an hour to two hours, depending on your experience inside a Macintosh—and this doesn't include the time it takes to acquire the necessary tools and the extra time involved if something goes wrong.

All in all, it makes sense to let a trained professional do the work, and *Macworld* recommends that you do so. However, some of our readers may simply want to know how a Mac upgrade is performed. The following pages show the steps involved in upgrading the memory of a Mac Plus or a Mac SE beyond 1MB.



Step 2.

Remove screws and battery cover. But first take precautions to avoid shock.

MacMemory's MultiSIMM include two 1MB SIMMs that use surface-mount chips. The MacSnap 2H is the same except it uses the larger DIP chips.

Alternatives

There are other types of memory upgrades, such as MacMemory's MaxPlus Mega and Levco's One Plus One, that work only on a Mac Plus. They have been cheaper than 1MB SIMMs because they reuse all four standard 256K SIMMs.

The MaxPlus Mega upgrade uses a long memory module on which the four original 256K SIMMs sit piggyback. The piggyback module fits in the first SIMM socket on the Mac Plus. This puts 1MB in the space formerly occupied by 256K. The MaxPlus Mega includes a regular 1MB SIMM for the second SIMM socket, providing a total of 2MB. The last two SIMM sockets can be filled at any time with another pair of SIMMs, either 1MB or 256K. The 256K SIMMs may be hard to find, however, since no one sells new ones and all the old ones are in use on the piggyback board.

The MaxPlus piggyback module is tall enough when installed to cover the Mac's processor chip. That precludes adding a big screen to your Mac Plus, because the screen must connect to the processor. If you later had to have a big screen, you would have to replace the piggyback module with a regular 1MB SIMM.

The One Plus One memory upgrade is a large rectangular card that sits above and parallel to the Macintosh logic board. It has SIMM sockets for the four 256K SIMMs that come with the Mac Plus, and it has 32 additional memory chips, for a total of 2MB. Two cables connect the rectangular adapter card to the first two Mac Plus SIMM sockets. The other two Mac Plus SIMM sockets are open for future memory upgrades, but can be filled with regular SIMMs only—either two 256K SIMMs, for a total of 2.5MB, or two 1MB SIMMs, for a total of 4MB. As with the MaxPlus, finding extra 256K SIMMs for the second two SIMM sockets may be difficult.

Levco includes a small fan with the One Plus One upgrade, which uses many more chips than regular SIMMs. All those chips generate heat. The fan is very quiet; you're unlikely to hear it over a hard disk.

The One Plus One board leaves enough space to attach some brands of big screens to the processor of your Mac Plus. If the screen's adapter card mounts directly above the logic board, it is probably incompatible with the One Plus One. If it mounts elsewhere inside the Mac and connects to the processor via a ribbon cable, it probably is compatible.

Installation

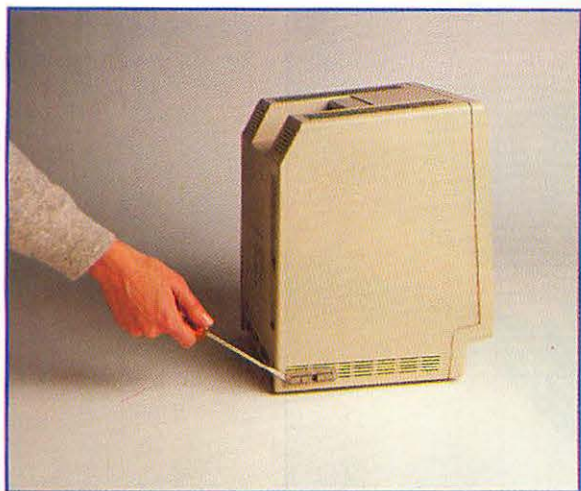
Gaining access to the logic board inside the Macintosh is the most difficult part of the upgrade procedure. The accompanying photos, diagrams, and text show how a memory upgrade is accomplished.

1. Get Tools

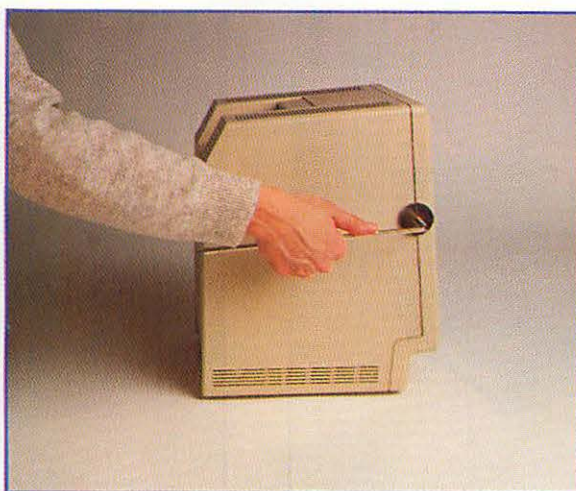
A successful and trouble-free installation job depends on using the right tools. Using makeshift tools increases the chances of damaging the Macintosh, the memory modules, or yourself. Use the best tools you can get.

Torx T-15 Screwdriver Mac Plus and Mac SE cases close with unusual screws. Loosening the screws requires a screwdriver with a Torx T-15 tip, a long shaft, and a long tip—at least 5 inches from the tip of the shaft to where the shaft emerges from the handle. Many hardware stores carry them. They are also available from manufacturers (such as Vaco), and Levco has been known to sell them.

Case Spreader Opening a Mac Plus or Mac SE without marring its case requires a case spreader. Before the back can be pulled off, it must be separated from the front bezel with a case spreader. There are several types of spreaders. Mentauris makes one by machining flanges on a door hinge and welding on a pair of handles. It also makes another version with welded-on flanges, which costs more and doesn't work as well.



Step 3.
Remove programmer's switch using a flat-blade screwdriver.



Step 4.
Use a case spreader to separate the front bezel from the case back.

Icon Review sells a case spreader with a Torx T-15 screwdriver at the other end of its long handle. The spreader is designed for one-handed operation, but its flanges are a bit thick and can be hard to fit into the groove between the front bezel and case back.

The Mac Opener takes a different approach. It looks like a large dental mirror with a ridge welded to its face. To spread the case, insert the ridge into the groove between the Mac's front and back casing and twist. The long handle has a T-15 screwdriver tip at the opposite end.

Antistatic Wrist Strap and Mat Technicians wear antistatic wrist straps and work on antistatic mats to avoid damaging components on the circuit board by static discharge. These items are like seat belts: failing to use them once may not cause a problem, but continually ignoring them leaves the Mac open to serious damage.

Digital Voltmeter If you're planning to install a memory upgrade in a Mac Plus other than regular SIMMs, the power supply outlet should be checked and adjusted. A high-quality digital voltmeter is necessary to get an accurate adjustment between 4.98 and 5.0 volts. Digital voltmeters usually cost \$100 or more.

Wire Cutters The lead to a resistor must be cut when upgrading from 1MB to 2MB, 2.5MB, or 4MB.

Soldering Iron and Solder When upgrading to an even 2MB, a 150-ohm resistor must be soldered onto the logic board.

Small Plastic Screwdriver The Mac Plus power supply may need adjusting after installing additional memory. This requires a small screwdriver with a plastic tip to prohibit video interference. While the case is open, you can use the screwdriver to tweak the video adjustments for best brightness, focus, width, and height. Metal screwdrivers can throw off adjustments.

Flat-Blade Screwdriver It may be necessary to pry some things with a thin flat-blade screwdriver.

2. Remove Screws

There are two screws near the ports and two more in the recessed handle at the top of the Mac. The Mac Plus has a fifth screw behind the cover of the battery compartment.

CAUTION: When performing surgery on the Mac, you should unplug it to avoid the danger of electric shock. The only exception to this rule is after the upgrade has been installed, when it is necessary to adjust the power supply. During this phase of the operation the risk of electric shock is especially high and special care should be taken to avoid touching dangerous components.

Even when the Mac is turned off and unplugged there is danger of receiving a life-threatening shock. High voltage is present on the analog board on some of the leads of the flyback transformer. Also,

if the high-voltage lead to the picture tube is frayed it can generate a dangerous shock. Don't remove the paper backing on the analog board and don't work on a board with damaged paper backing.

Always wear rubber-soled shoes and avoid touching any component unnecessarily. Especially avoid touching circuitry (generally, any exposed metal surfaces). When possible keep one hand free, and avoid touching grounded objects with that hand.

3. Remove Programmer's Switch

When a programmer's switch has been installed on the side of the Mac near the printer port, pry it off using a flat-blade instrument such as a screwdriver.

4. Spread Case

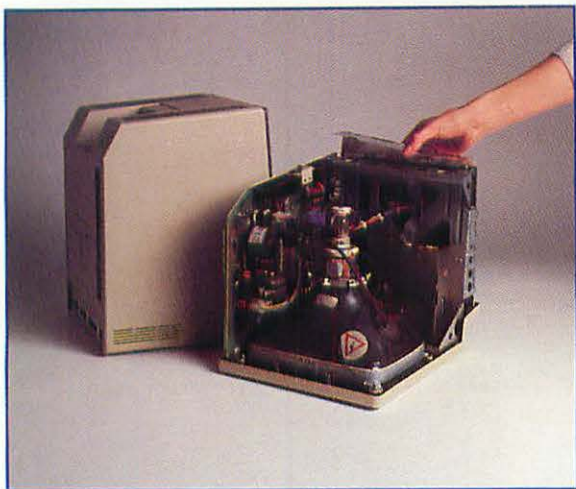
The Mac's case back sticks to the front bezel and can't easily be pulled off. Use a case spreader to separate the two.

5. Remove Case Back

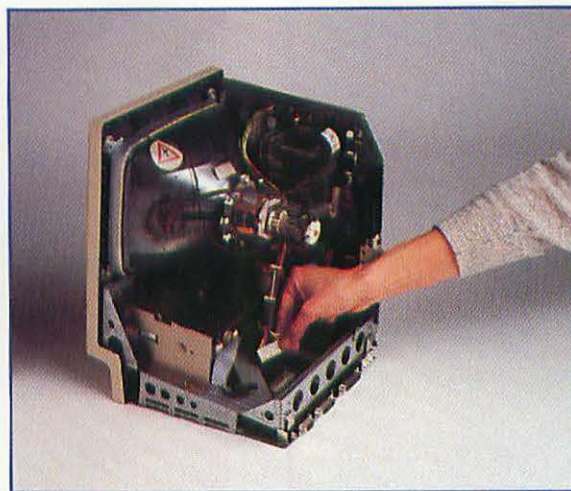
Place the Mac on its face and lift off the back part of the case, setting it aside, out of the way. Be careful not to scratch the surface of the tube when placing the Mac face down.

6. A Firm Grounding

Some of the Mac's internal components can be damaged by static discharge. Technicians avoid this by wearing a grounding wrist strap on the hand they use to touch static-sensitive components. If



Step 7.
After removing the case back, lift off the RF shield.



Step 8.
*Disconnect the internal cables from the logic board.
Here, the power/video cable is being disconnected.*

none is available, the metal chassis can be touched, before touching any other parts, to dissipate static electricity.

7. Remove RF Shield

The next step requires the removal of the Radio Frequency Shield, the metal foil under the logic board, which prevents the Mac from transmitting radio interference to other electric devices. Double-check to make sure the Mac is unplugged. The logic board lies flat on the bottom of the Mac. The analog board sits upright on the right side of the Mac as you face the back of the computer. The analog board contains most of the high-voltage components, including the flyback transformer and the power supply. It's not necessary to remove the analog board, and you should only touch it when absolutely necessary. Lift off the RF shield and place it inside the empty case.

8. Disconnect Internal Cables

Several cables run from the logic board to other internal components. The Mac must be upright so the cables can be disconnected.

Ribbon cables connect the internal disk drive or drives to the main logic board. All internal drive cables must be unplugged from the logic board and tucked out of the way.

The power/video cable runs from the analog board to the logic board. Disconnect it from the logic board. On an SE

there is a catch on the connector that attaches to the logic board that must be released. On a Mac Plus there is no catch and the connector can only be removed by pulling firmly.

CAUTION: The power/video cable will resist being disconnected. If yanked forcefully, the cable will come free suddenly and cause the pulling hand to smack against the end of the picture tube. The tube will gasp and give up the ghost. So steady one hand with the other while working the connector loose. A new picture tube costs more than \$100 installed.

If the Mac has an internal modification such as a big-screen adapter, internal hard disk, or accelerator card, there may be other cables to disconnect at this time. Installations vary, so it's necessary to study the one at hand and determine what else needs unplugging. Try to disconnect all wires from the logic board. It may not be possible to disconnect everything at this point; you may have to pull the logic board free first.

9. Remove Logic Board

Clear a space large enough to set the logic board on after removing it. Place the Mac with its screen face down.

On a Mac SE, it's necessary to lift up the logic board about a quarter inch and pull the right edge outward, as if opening a door. After this, the left edge should be pulled away from the chassis. The Mac SE logic board will still be connected to the speaker, so the speaker wire should be unplugged at this time. If there are other

wires still connected, unplug them too.

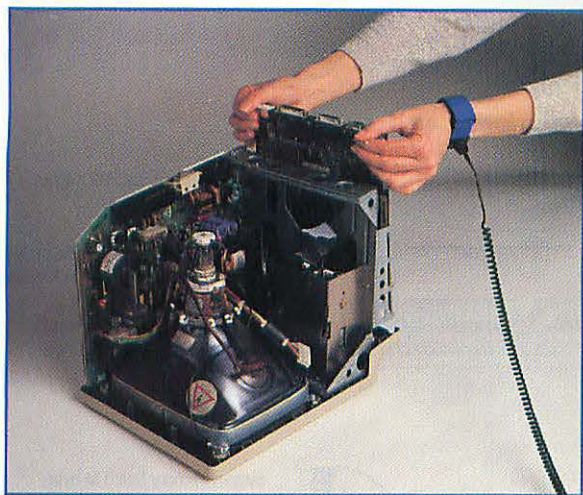
On a Mac Plus, the logic board is designed to slide out. Grasp it firmly and pull up. It's probably not possible to slide the logic board out if it has an adapter card attached. In that case, use a flat-blade screwdriver to gently pry the right edge of the logic board away from the chassis bracket. Then you can swing the board out like a door. It may help to slide the logic board up a quarter inch before prying its right edge free.

10. Remove SIMMs

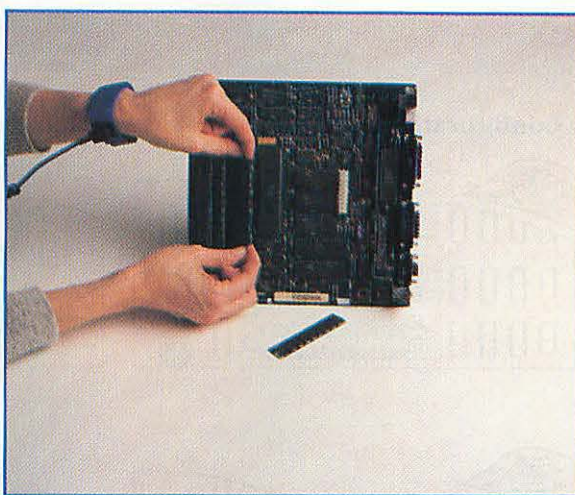
Place the logic board on a nonstatic surface (not a rug), chips face up and SIMMs near you. Remember, a static spark can ruin SIMMs. Avoid the circuitry; touch the SIMMs only on the two edges that have no circuitry. Using both hands, spread apart locking tabs on one SIMM with your thumbs (it helps to have thumbnails) and pull the SIMM toward you with your index fingers. Don't use excessive force. Place the SIMMs on a nonstatic surface after removing them.

11. Install Replacement Memory

There are some rules about populating SIMM sockets on Mac Plus and Mac SE logic boards. You must fill an even number of sockets—two or four. If you only fill two sockets, they must be the first two sockets. Each pair of sockets must have the same denomination SIMM, either 256K or 1MB.



Step 9.
Slide out the logic board. On an SE the procedure is somewhat different.



Step 10.
Remove each SIMM by spreading apart the locking tabs and pulling the SIMM away from the logic board.

If any 1MB SIMMs are present, the first two SIMM sockets must contain 1MB SIMMs. As a result, a Mac Plus or Mac SE can have a total of 0.5MB, 1MB, 2MB, 2.5MB, or 4MB of RAM. No other sizes work. "Memory Rules" shows all acceptable SIMM configurations.

If installing 1MB SIMMs, first fill the sockets nearest the center of the logic board on a Mac Plus or the leftmost sockets on a Mac SE. Fill extra sockets with 256K SIMMs removed in the last step or with additional 1MB SIMMs. Keep the leftover 256K SIMMs as spares or sell them if you can find a buyer.

If installing a long piggyback module on a Mac Plus, put the old 256K SIMMs on the piggyback module. Then put the module in the SIMM socket nearest the center of the logic board. Put a 1MB SIMM in the second socket. Fill the other two sockets with 256K SIMMs or 1MB modules of any kind, or leave the sockets empty.

If installing a Levco-style adapter card, first put the recently removed 256K SIMMs on it. Then plug its two ribbon cables into the two SIMM sockets nearest the center of the logic board and attach the card to the logic board. Leave the remaining SIMM sockets empty, or fill them with regular 1MB or 256K SIMMs.

It's important to follow the upgrade manufacturer's specific instructions, if there are any.

12. Adjust RAM SIZE Resistors

The presence or absence of two 150-ohm resistors on the main logic board tells the Mac how much memory is installed. The words RAM SIZE are stenciled on the logic board to identify these resistors. On a Mac Plus, they are located diagonally opposite the keyboard connector. One resistor has the labels R8 and 256KB. The second resistor has the labels R9 and 1 ROW. On a Mac SE, the resistors are located above the SIMM sockets. One resistor has the labels R35 and 256KB. The other resistor has the labels R36 and ONE ROW. The 256KB or 256K BIT resistor is present if the first two SIMM sockets contain 256K SIMMs, and is absent if they contain 1MB SIMMs. The resistor labeled 1 ROW or ONE ROW is present if the last two SIMM sockets are empty, and absent if they're occupied. "Memory Rules" correlates RAM SIZE resistor placement with SIMM configuration.

Upgrading from 1MB to 2-, 2.5-, or 4MB requires clipping the resistor labeled 256KB or 256K BIT. Clip one lead close to the logic board and pivot the resistor aside. Don't clip the resistor off the board entirely. Make sure the clipped lead doesn't touch anything else after it's pivoted. That way the operation is reversible with just a little solder.

An upgrade from 1MB to exactly 2MB leaves the second pair of SIMM sockets empty. This configuration requires that a 150-ohm resistor be installed in the location labeled 1 ROW or ONE ROW.

Memory upgrades other than regular SIMMs may have different rules for configuring the RAM SIZE resistors. Some installers use jumper wires instead of resistors, or they use resistors of a slightly different value. Such upgrades may also install a jumper at other, electrically equivalent locations on the logic board.

13. Reinstall Logic Board

A Mac Plus logic board upgraded solely with regular SIMMs should slide easily into the chassis. If the logic board has a long piggyback module or an adapter card installed, it probably won't slide into place. To install a thick logic-board assembly, place its left edge in the chassis and swing it into place as you would close a door. If necessary, use a flat-blade screwdriver to pop the right edge of the logic board into the track on the chassis.

A Mac SE logic board is designed to be swung into place. Reconnect the speaker wire at this point. After you insert the left edge into the chassis, swing the right edge toward the chassis. Then maneuver the logic board up and down slightly until it drops into place, reversing the operation in step 9.

14. Reconnect Internal Cables

Stand the Mac upright and reconnect the power/video cable and internal disk drive cables that you disconnected in step 9.

Memory Rules

Macintosh Plus Memory Configurations

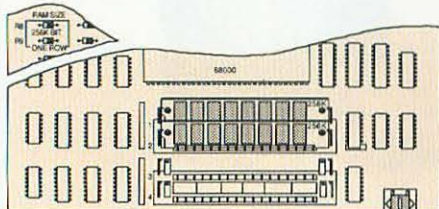
System Memory Size: 512 K Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 256 KB
- Row 2 (SIMMs 3 & 4): Not Installed

RAM SIZE Resistors

- 256K BIT (R8): 150 Ohms
- ONE ROW (R9): 150 Ohms



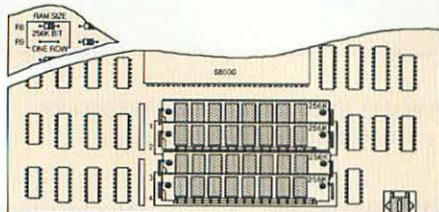
System Memory Size: 1 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 256 KB
- Row 2 (SIMMs 3 & 4): 256 KB

RAM SIZE Resistors

- 256K BIT (R8): 150 Ohms
- ONE ROW (R9): Not Installed



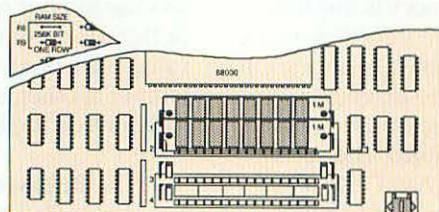
System Memory Size: 2 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): Not Installed

RAM SIZE Resistors

- 256K BIT (R8): Not Installed
- ONE ROW (R9): 150 Ohms



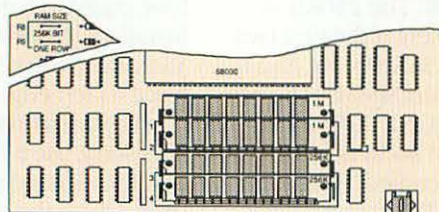
System Memory Size: 2.5 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): 256 KB

RAM SIZE Resistors

- 256K BIT (R8): Not Installed
- ONE ROW (R9): Not Installed



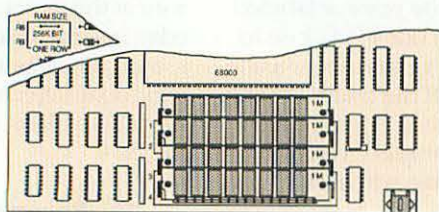
System Memory Size: 4 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): 1 MB

RAM SIZE Resistors

- 256K BIT (R8): Not Installed
- ONE ROW (R9): Not Installed



Macintosh SE Memory Configurations

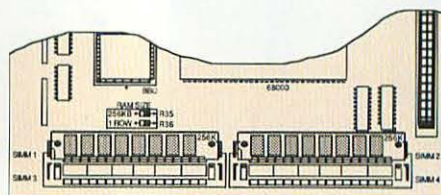
System Memory Size: 512 K Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 256 KB
- Row 2 (SIMMs 3 & 4): Not Installed

RAM SIZE Resistors

- 256K BIT (R35): 150 Ohms
- ONE ROW (R36): 150 Ohms



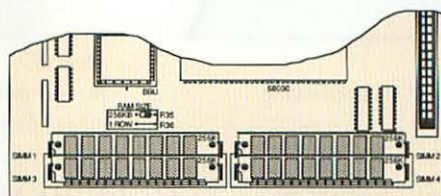
System Memory Size: 1 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 256 KB
- Row 2 (SIMMs 3 & 4): 256 KB

RAM SIZE Resistors

- 256K BIT (R35): 150 Ohms
- ONE ROW (R36): Not Installed



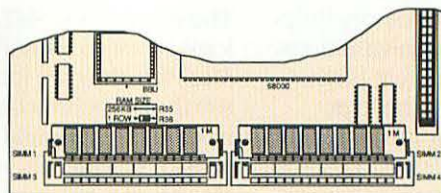
System Memory Size: 2 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): Not Installed

RAM SIZE Resistors

- 256K BIT (R35): Not Installed
- ONE ROW (R36): 150 Ohms



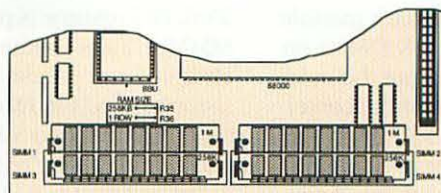
System Memory Size: 2.5 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): 256 KB

RAM SIZE Resistors

- 256K BIT (R35): Not Installed
- ONE ROW (R36): Not Installed



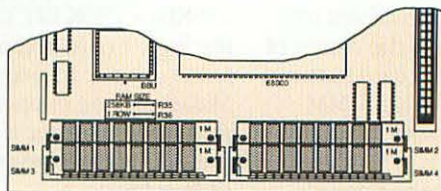
System Memory Size: 4 M Bytes

SIMMs Configuration

- Row 1 (SIMMs 1 & 2): 1 MB
- Row 2 (SIMMs 3 & 4): 1 MB

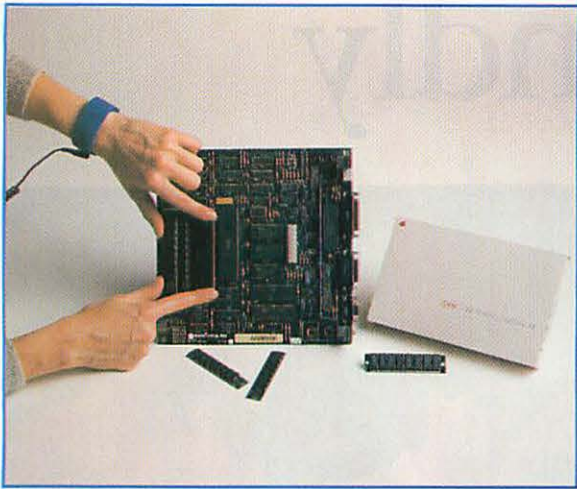
RAM SIZE Resistors

- 256K BIT (R35): Not Installed
- ONE ROW (R36): Not Installed

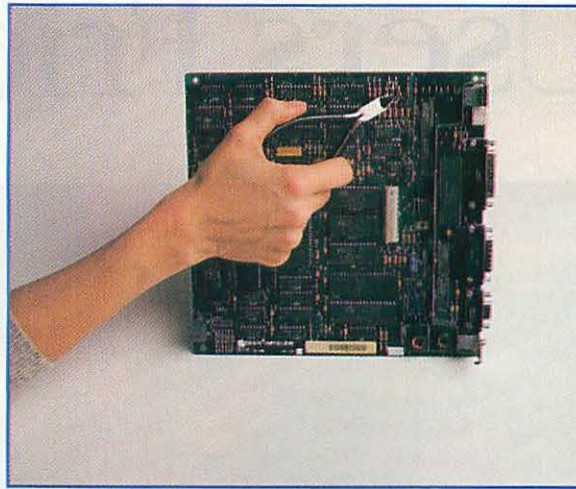


Memory Rules

SIMMs can be installed only in these configurations. Printed with permission from Apple Computer.



Step 11.
Install the replacement memory, using the proper configuration (see "Memory Rules").



Step 12.
Adjust the RAM SIZE resistors by clipping one lead and pivoting the resistor aside.

8. If there are other internal accessories such as a large screen, reconnect those cables also.

15. Install Fan (Optional)

Some memory upgrades come with a cooling fan. If the fan mounts inside the Mac, follow the manufacturer's instructions now for installing the fan. You don't need to add a fan after upgrading with regular SIMMs.

16. Adjust Power Supply

If you've installed SIMMs, you don't have to complete step 16. However, additional memory may draw more electrical current with a long piggyback module or an adapter card. On a Mac Plus, this lowers the output voltage of the power supply. You can adjust the voltage level with a small plastic screwdriver while the case is open. The Mac SE power supply adjusts itself.

To adjust the Mac Plus power-supply voltage, ground one probe of a DC voltmeter by inserting it into the serial port screw hole. Use the voltmeter to find which of the eight leads has closest to 5 volts on it. Insert the other probe into the 5-volt lead on the power/video cable connector. After you've attached the voltmeter, both

your hands should be free to make adjustments.

Plug in the Mac and switch it on.

CAUTION: While the power is on, avoid touching any circuitry or components to protect against receiving an electric shock while the case is open. Then adjust the voltage for +5 to +4.98 volts DC. The adjustment control is located near the top-rear corner of the power-supply board. Avoid setting the voltage above +5 or the power supply may start to cycle itself off and on as a protection against overvoltage.

17. Reinstall RF Shield

Before going any further, turn off the power and unplug the Mac's power cord to avoid unnecessary exposure to electric shock. Place the Mac on its face again and hang the RF shield over the ports, so that it covers the soldered side of the logic board.

18. Close Case

With the Mac on its face, slip the case back on. If the case catches, just work with it patiently. You may have to use a flat-blade screwdriver to widen the groove inside the cover where the analog board fits. Squeeze the case together evenly.

19. Install Screws

A Mac Plus has five screws, a Mac SE, four. The two black screws go nearest the ports at the bottom of the Mac.

20. Reinstall Programmer's Switch

The programmer's switch is optional. It fits in the cooling vents at the bottom of the Mac, near the back on the left side.

21. Reset Control Panel and Chooser

Removing the logic board on a Mac Plus disconnects the clock battery. After you put the Mac Plus back together, most Control Panel options revert to standard settings. For example, the clock and calendar are set to midnight, January 1, 1904. The Chooser is affected also. Be sure to adjust the Control Panel and Chooser to your preferences. You shouldn't need to reset the Control Panel and Chooser on a Mac SE, because its battery is on the logic board and isn't disconnected during a memory upgrade. □

The author would like to thank John Sawyer of CJS Systems and Wally Clegg of PCW Communications for their valuable technical assistance in preparing this article.

See *Where to Buy* for contact information.

Users Friendly



Shopping for software at the Seattle Macintosh Downtown Business Users Group.

RICH FRISMAN

Berkeley Macintosh User Group, Thursday night meeting.

Question from the audience: I have a Mac Plus. How should I upgrade its memory? I want to run HyperCard and Multifinder.

Discussion leader: The cheapest way is to get four Toshiba surface-mount one-megabit SIMMs that are 120 nanoseconds or faster and install them yourself. If they're surface mounted, you can do it.

Voice from the audience: Whaddaya mean? One-twenty-nanosecond chips are the fastest—

Leader: No, 80-nanosecond SIMMs are becoming available.

Original inquirer: Won't that void my warranty?

Leader: Then install an Apple upgrade. But it's much more expensive.

Voice from the audience: If something goes wrong, just pull the SIMMs out and they'll never know.

Another voice: Yes they will! You have to clip a resistor when you install the SIMMs.

First voice: It's the same resistor they clip for an Apple upgrade. Anyway, we can do a pretty good job of resoldering it. *(Laughter.)*

Leader: *(to original inquirer)* Do you have a hard disk?

Inquirer: No.

Leader: Buy that first. In order of importance, get a hard disk, a large screen, more RAM, and an accelerator card.

In the back, two guys argue about whether to get the RAM before the screen. They sound like the beer commercial: "Less filling!" "Tastes great!"

Welcome to the user group, a last bastion of the Mac spirit in computing and one of the best sources of computer help around.

Know-how and enthusiasm make user groups a best bet for Mac support

by Michael Alexander

Stereotypically, computer user groups figure as a kind of second cousin to "Star Trek" fan clubs. Instead of trekkies, they're populated by techies (mostly male), who prefer COBOL to English and like to spend their Saturday nights debugging public-domain utilities. Not so long ago, Apple co-founder Steve Jobs predicted that the advent of friendly computers like the Macintosh signaled the beginning of the end for computer clubs; no longer needed, they would wither and die.

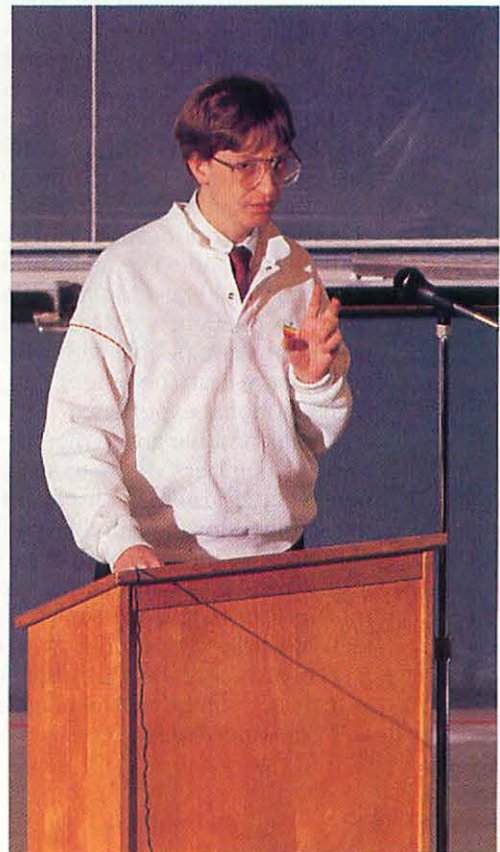
In fact, Mac user groups are growing rapidly as users turn to them in increasing numbers to fill the gaps in the Mac support network left by dealers and developers. There are now about 800 Mac user groups (MUGs) in the United States, up 20 percent over a year ago. And the character of the groups is changing to reflect the changing profile of Macintosh users. Alongside the traditional, general-interest, geographic-based groups, special-interest groups are springing up in increasing numbers to cater to the needs of professionals and others who share common problems. Business and corporate groups have increased 71 percent in the last year; groups oriented around specific professions or subject areas are up 30 percent; and government Mac user groups have increased in number from 1 to 10.

The reasons for the growing interest in user groups are no mystery. As Leon Ablon, president of the New York MUG, says, "We offer services that dealers and manufacturers cannot possibly supply, because it's uneconomical." At meetings members get product previews, hear the latest gossip, and enjoy the fellowship of people who can appreciate their Mac problems and achievements. Special-interest groups (SIGs) bring together spreadsheet artists, HyperCard authors, graphics aficionados, programmers, musicians, doctors. There are groups for Mac novices and people with disabilities. Those who don't attend meetings keep informed with newsletters; techies talk on bulletin boards; the desperate and confused seek answers over telephone help lines; the adventurous explore public domain software from the disk libraries; and the

budget-conscious take advantage of discounts at local computer stores. All of this typically costs \$15 to \$40 a year.

A recent *Macworld* survey revealed that Mac owners find user groups a better source of information than dealers, ads, or business contacts. The groups often have information on new products or software problems months before consumer magazines are able to print it. At their best, groups provide contact with knowledgeable, friendly, live humans who can help you with your Mac problems and who aren't trying to sell you anything.

Groups give individual users a chance to meet and influence industry leaders. Here Microsoft chairman Bill Gates addresses the Boston Computer Society.



Michael Alexander says that BMUG's advice has saved his life on two occasions. He is editor and publisher of Stacks, the HyperCard design newsletter.

Getting the News

Almost every MUG prints a newsletter, but some of them do such a fine job that it's worth joining up to receive the publication even if you'll never be in the neighborhood for a meeting. Here's a list of some of the finest.

■ *The BMUG Newsletter* exceeded 300 pages with the latest issue. Twice a year it prints articles on hardware, software, and programming, along with the usual opinionated product picks that endear Team BMUG

to the newsletter's loyal readers. BMUG, 1442A Walnut St., #62, Berkeley, CA 94709, 415/849-9114. Membership \$40/year. Back issues \$15.

■ *The Active Window*, published monthly, stands out for its original material and its reliability. Boston Computer Society Mac User Group, 48 Grove St., Somerville, MA 02144, 617/625-7080. Membership \$35/year; associate membership (outside New England) \$28/year.

■ *Mouse Droppings*, a monthly newsletter, boasts intriguing gossip, good technical hints, and timely bug reports. MUG of Corvallis, 1695 N.W. Division St., #3, Corvallis, OR 97330, 503/563-2501. Membership \$22/year.

■ *The Mac Street Journal*, from NYMUG, seems to get bigger each month. New York Mac Users Group, P.O. Box 2269, New York, NY 10116, 212/691-0496. Membership \$25/year.
—Nancy E. Dunn

That Old-Time Spirit

In addition to offering services most of us couldn't afford if we had to pay for them, user groups provide something difficult to find these days at any price: genuine enthusiasm. Without this spirit, the groups—many of which are highly organized and most of which carry on without paid staff—couldn't exist at all.

What motivates group members to donate so much time and energy? Besides a desire to socialize or to show off Mac knowledge, the answer seems to be true love. Leon Ablon, the NYMUG president, is typical. Asked why he does it, this consultant and professor of mathematics at City University of New York answers, "I get a lot of gratification. I love to see people involved with this machine. I've hung around mainframes all my life, but I would never join an IBM mainframe group. Yet when I bought my Mac, I immediately looked for a user group, and people with whom to talk. I guess I talked more than the others, so I became president. It is an emotional experience."

Rank-and-file group members benefit from experienced members' desire to share. A percentage of the new members, in turn, discover themselves drawn to the satisfactions of volunteering.

Because most clubs operate on a volunteer basis, for the most part without the encumbrance of a profit motive, they're able to take a refreshingly irreverent view toward the Mac industry. In their newsletters, bulletin boards, and meetings, clubs stand up for the individual user, sometimes leaving the industry's prime movers somewhat shaken.

The Berkeley Macintosh Users Group, for example, has such an aversion to sales hype that it warns developers not to send marketing people to meetings and to avoid any talk of why someone might want to own a product; instead, developers are urged to send technical staff and to simply demonstrate what a product can do. A passionate group, BMUG audiences are reminiscent of the legendary opera fans of Italy, gleefully heaving tomatoes at any hapless singer whose warbles are less than perfect.

WordPerfect Corporation found this out the hard way when it demonstrated a prerelease version of its new Mac word processor. BMUG's 21-year-old co-founder Raines Cohen sums up what happened: "They came. They showed. They crashed." Numerous times. It didn't help that WordPerfect's marketing reps seemed not to know their product as well as did some members of the audience, who had been beta-testing it for weeks. WordPerfect wasn't unique. "Happened to Microsoft, too," Cohen says.

BMUG isn't the only tough bunch. When Jean-Louis Gassée, Apple's head of research and development, spoke to the New York MUG last year about Apple's new machines and the future of computing, some questioners used him as a convenient target for complaints about what they saw as Apple's deficiencies in user support. The exchange grew as hot as the analog board of a Mac 512, but perhaps it had an effect. Re-

cently Apple has been making noises about improving its help to users.

Local Groups

Although business and specialized groups are all the rage, local general-interest groups are still the most common type of MUG. A cross-country tour could take you from Applesauce in East Longmeadow, Massachusetts, to the Short Hills Apple Pits in New Jersey, through Lincoln, Nebraska, home of the Mackey Mouse Club, and on to Winston, Oregon, where you could attend a meeting of the Apple Blossom club.

Meetings everywhere take roughly the form that *Macworld* columnist Steven Levy says was established at Silicon Valley's original Homebrew Computer Club, where Apple was born. Typically, a question-and-answer period is followed by one or more demonstrations, and then informal conversations or special-interest gatherings. Tables in the room display public domain and shareware disks for sale, along with product literature and copies of the group's newsletter. If the group is large, special-interest meetings may be held on different nights. There is always a separate group or some other form of special attention for beginners.



Disabled Children's Computer Group member Diana Lauterbach tries out a Personics HeadMaster at the club's resource and training center. The apparatus enables people who can't use a mouse or keyboard to point to on-screen letters using a "puff and sip" mechanism.

National Groups

Some groups have grown so large or offer such outstanding services that they have attracted national interest. Though its roots are deep within the University of California, BMUG today—with over 3000 paid members—is a national user group. BMUG is so active that its main meetings are weekly, surpassing even other major groups, which meet in full session only once a month.

Many members, particularly the thousand who don't live in the San Francisco Bay Area, pay \$20 a semester just to get the famous semiannual "newsletter" (the current edition is over 300 pages—see "Getting the News"). Nonlocal members can also call the particularly knowledgeable help-line staff. The bulletin board has four lines, and is often first with new software and information.

The Boston Computer Society boasts the biggest national Macintosh user group. At 8000 members, it's so large that it has seven regional units throughout New Hampshire, Rhode Island, and Massachusetts. "We're the granddaddy of computer groups," says Rebecca Waring, executive director of BSC and editor of its respected 60-page monthly newsletter *The Active Window*.

BCS has over 40 special-interest groups. The Mac section has high-powered medical, legal, design, technical, and engineering groups, and even the SIGs attract major speakers. Some SIGs are Mac only, but others, like desktop publishing, are subject- instead of machine-based.

BCS Mac conducts training seminars in its own office at least three nights a week. Subjects range from introduction to the Mac to the intricacies of Quark XPress or Excel. The instructors are professionals, the cost is \$25, and many companies send employees to learn new programs or new machines.

BCS costs \$28 a year for members outside New England. There are members in all 50 states—including 1000 in California—and in 40 countries. You get subscriptions to two newsletters of your choice (even the special-interest groups have newsletters), a bimonthly color magazine, and a buying guide listing stores and companies that give at least a 10 percent discount to BCS members. New England members pay \$35 and receive a calendar that lists more than 200 meetings a month.

Specialized Groups

Where the Mac goes, Mac user groups are bound to follow, and today the Mac is going into large corporations. According to Lockheed Employees' Apple User Group ambassador Mike Bailey, LEAUG was actually instrumental in helping the aerospace giant get over its Big Blue bias. "We convinced many people with Macs to take them to work. We put Macs on the desks of people who we thought would change their minds if they could use one. We got Apple to donate computers for a short period, and to put on special demonstrations."

Disk Collectors

Some user groups specialize in training seminars, some in BBS hyperactivity, and some in tracking down every new public domain or shareware utility. The MUGs listed here are renowned for their disk collections, and yes, they do mail order. Most disks cost less than \$10.

Apple Corps of Dallas shares a 400MB collection with the Mac Pack. It offers up to 30 new disks each month of screened and tested software and stacks, each one with a Read Me file describing its software offerings. *P. O. Box 835537, Richardson, TX 75083, 214/357-9185. Membership \$20/year.*

BMUG's latest newsletter has 26 pages of disk index—and that's just the titles and disk reference. *1442A Walnut St., #62, Berkeley, CA 94709, 415/849-9114. Membership \$40/year.*

Boston Computer Society Mac User Group publishes a directory for its collection. *48 Grove St., Somerville, MA 02144, 617/625-7080. Membership \$25/year.*

Macadamia maintains a 130-disk collection, sorted into about 40 categories and cataloged in a HyperCard stack. Disk of the month available for \$1 plus an empty disk and postage. *P. O. Box 333, Crystal*

Lake, IL 60014. Membership \$15/year.

MacTechnics takes an almost obsessive approach to collecting public domain software and shareware; the result: 250 disks grouped in 70 categories. *P. O. Box 4063, Ann Arbor, MI 48106. Membership \$25/year.*

Northern Illinois Computer Society offers fifty 800K disks of software in 15 categories, plus another thirty 800K disks of HyperCard stacks. *P. O. Box 547, Arlington Heights, IL 60006. Membership \$30 first year, \$24/year thereafter.*

—Nancy E. Dunn

Specialists

The following clubs all specialize in a single subject area and have a national membership. Let *Macworld* know if you have a professional or other special-interest group not listed here.

■ **Boston Computer Society Medi-Mac Group**, 48 Grove St., Somerville, MA 02144, 617/625-7080.

■ **San Diego Medical Apple Users**, 3444 Kearny Villa Rd., #303, San Diego, CA 92123.

■ **Computer Hebrew User Group**, 21 Bennet Ave., #46, New York, NY 10033, 212/923-4825.

■ **CPA Computer Users Group**, P.O. Box 56, Narberth, PA 19072.

■ **SigMAChem**, Chemistry and Biochemistry Dept., Texas Tech University, Lubbock, TX 79409, 806/742-3057.

■ **Mac Engineering User Group**, 8710 W. 68th Pl., Arvada, CO 80004.

■ **Aviation & Computer Enthusiasts**, 2009 Camelot Dr., Las Cruces, NM 88005.

■ **Mac Buddhist LA**, 2605 North Beachwood Dr., Los Angeles, CA 90068, 213/464-3599.

■ **Realtors Mac User Group**, 18023 Sky Park Circle, F-2,

Irvine, CA 92714, 714/261-1930.

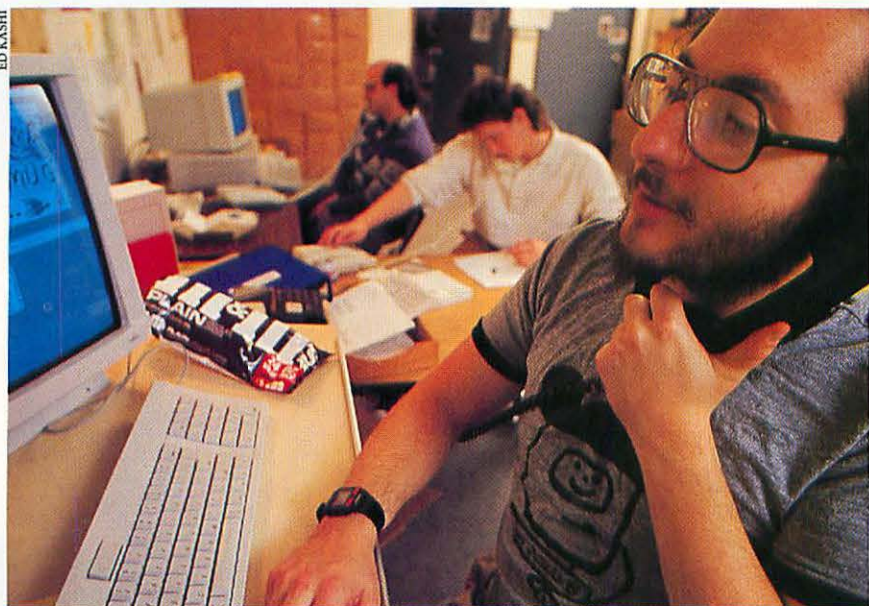
■ **The Disabled Children's Computer Group**, 2095 Rose St., Berkeley, CA 94709.

■ **MEGA (Macintosh Entertainment Guild of America)**, 1032 N. Sycamore Ave., Hollywood, CA 90038. Call Peggy MacAffee, 213/653-0240.

■ **American Bar Association Macintosh Users Group**, 750 N. Lake Shore Drive, Chicago, IL 60611, 312/988-5598.

■ **MacForth Users Group**, Box 3081, Westville Station, New Haven, CT 06515.

—Nancy E. Dunn



Club help lines are always a popular resource. If Berkeley Macintosh User Group hotline helpers Raines Cohen, Randy Simon, and Steve Costa (front to back) can't answer your question themselves, they can usually refer you to someone who can.

Bailey says that today Lockheed's Macintosh group benefits the company by offering employees computer solutions and training. Some courses are taught by volunteers, but major publishers also send their experts. The Lockheed group's 500 employee members benefit from discounts on hardware and software.

Introducing the Mac to another large organization, the federal government, has been slow going. But Steve Broughall, president of the expanding 200-member Pentagon MUG, says that "numerous other agencies have asked us about forming groups." As with corporate groups, he says, the emphasis is on "workplace solutions. We coexist with regional groups, because we don't offer such wide-ranging services."

Besides organization-specific groups, other specialized groups bring together people of common professional or other interests. Daniel Kegan chairs the American Bar Association's Macintosh User Group from Chicago. ABA Mac's national membership has no meetings except get-togethers at national ABA conventions, so most of the communication is through a quarterly newsletter or over the E-mail or conferencing facilities of the ABA's electronic network.

In Berkeley, Jacquelyn Brand and a group of parents of children with disabilities formed a computer club that has become a model for 14 others across the country. The Disabled Children's Computer Group is a resource center that gives members access to adaptive devices that enable people with disabilities to use

computers. Apple has provided equipment and set up a National Special Education Alliance to help DCCG share information with similar groups. DCCG is the first user group of its kind and is run mostly by volunteers. It serves 2700 kids and adults, families and teachers a year.

Skill level determines yet another type of Mac user group. In New York City, Stuart Gitlow, a medical student and early member of NYMUG, became frustrated with what he perceived as a bias at NYMUG toward beginners. So last April, Gitlow and two others founded the LaserBoard Mac Users Group, which exists mostly as a bulletin board. According to Gitlow, it attracts "programmers, developers, advanced business users, power users, and other people who use the Mac every day." If not every instant.

Supergroups

Last year, Apple finally recognized the value of user organizations and assigned new coordinators to work with the growing higher education, business, and government groups. The groups themselves are forming supergroups. At January's Macworld Expo in San Francisco, corporate, government, and business groups began planning a National Apple Professional Information Exchange. It will sponsor technical papers, tell developers and Apple what hardware and software improvements corporations need, help more corporate groups get started, and perhaps set technical standards. The groups extol Apple's support but emphasize their independence.

All groups can link together through three different electronic networks. As a result, important Mac information—bug fixes, new products, new public domain software, or solutions to your Excel spreadsheet problem—can reach you anywhere in the world in one to four days.

Your Choice

If all that sounds like a good deal, visit your local user group. To find it, call Apple's User Group Directory, 800/538-9696, extension 500. If your neighborhood group doesn't meet your expectations, try one of the national or special-interest groups. The help you get can be invaluable, you may find the experience is great fun, and membership dues are trivial. Are there any disadvantages?

Ray Stubbs, the guy at the BMUG meeting who asked about memory upgrades, ponders the question. "A thorough discussion here can be quite complex," he says. "When I come, I learn a lot. Also, when I come I buy a lot, so I don't always want to come." □

Expanding the Conversation

An overview of AppleTalk network products

Many Mac owners installed

by David R. Kosiur

AppleTalk simply to connect their Macs to a LaserWriter. But Apple designed AppleTalk with a complete set of protocols, or rules, for communicating on a network. These protocols let you do more than send print instructions to a shared LaserWriter. You can also exchange data, correspond through electronic mail, access other peripherals such as modems and plotters, run multiuser software, link up to mainframes, and send data at faster transmission rates across Ethernet.

The protocols that permit these network capabilities follow the criteria of the Open Systems Interconnect (OSI) seven-layer model, as proposed by the International Standards Organization (see "The Ethernet Solution," *Macworld*, January 1988). Apple designed each layer to communicate with the layer above and below in a specified manner. As a result, a developer can program new procedures into a layer's protocols so long as the data passed up or down the layers adheres to Apple's specifications. Apple's modular layer model has simplified the task of running AppleTalk over different network media, such as Apple's LocalTalk and EtherTalk, Farallon's PhoneNet, and DuPont's fiber-optic cable. The ability to use these diverse cabling schemes and protocols has produced, in turn, a very dynamic network.

David R. Kosiur is the publisher and chief editor of Connections, a newsletter about Macintosh networks.

Making the Connection

Work groups can set up a relatively inexpensive AppleTalk network. Apple's LocalTalk uses a connection box for each device and shielded twisted-pair cable to link computers and peripherals. The connection box maintains network continuity even when you disconnect a Mac from the box.

Farallon Computing offers an alternative wiring scheme for AppleTalk networks. Farallon's PhoneNet uses unshielded twisted-pair cable, or phone wire, to link the devices on a network. The connection box, while similar to Apple's, uses standard phone jacks and requires a terminating resistor at the ends of the network (Apple builds a terminating resistor into the connection box). The PhoneNet system offers various advantages over LocalTalk. The phone jack connects better than Apple's former friction-fit connector. PhoneNet can use the same cables as your phone system, and it supports network distances of 3000 feet compared to LocalTalk's 1000 feet. In fact, Farallon's PhoneNet has become so popular, especially among corporate users, that other manufacturers now offer PhoneNet-compatible connectors.

As your network grows, you may find LocalTalk's 230,000 bits per second (bps) too slow. To improve data transmission rates, install an Ethernet network and run Apple's EtherTalk. EtherTalk interfaces AppleTalk protocols with Ethernet to let Mac programs take advantage of Ethernet's higher data transmission speeds and wider bandwidth. Wider bandwidth per-





mits more users to transmit data on the network without degrading the overall network performance.

Another network medium, fiber optics, also allows wider bandwidth. DuPont offers converters, which interface AppleTalk to fiber-optic cable, and a central controller for forming small networks. The fiber-optic bandwidth is even wider than Ethernet's and thus can carry more network traffic. Network lengths, however, are limited to 1000 feet. Fiber optics also offers the advantage of data security, since it's almost impossible to tap the cables. Unfortunately, fiber-optic cable is expensive and difficult to install.

Network Topologies

The number of network nodes and the geographical distance between them will to some extent determine your selection of a network configuration, or *topology*. LocalTalk cabling only supports a *daisy chain*, while PhoneNet offers *trunk*, *passive star*, and *active star* networks (see Figure 1). Daisy-chain or trunk topologies are ideal for small networks located in a relatively restricted space. For more flexibility, choose a passive star topology that takes advantage of existing phone wiring; you can install a passive star net in the phone system utility closet. For large networks that present problems of distance or performance, consider an *active star topology* and perhaps a *repeater*. Farallon's StarController lets you connect 12 branches to the controller; each branch supports 3000 feet of wiring, to create one 36,000-foot network. If

you need to link only one or two nodes located on "the north forty" to the rest of the network, invest in a repeater, a device that amplifies the signals that run on AppleTalk or PhoneNet cables. Repeaters usually allow you to increase the distance between nodes by a factor of two or three, but you can often chain repeaters together for even greater distances.

Servers

After you've selected a network topology, identify the kinds of tasks you expect the network to perform and choose an appropriate *server*. These network devices literally offer services to each user and allow multiple workstations to use a peripheral device. *Disk* and *file servers* support access to information on a disk (or disks); *print servers* or *spoolers* handle print jobs, most commonly for LaserWriters; *modem servers* allow clients to share a modem; and *device servers* let users connect to, and share, non-AppleTalk devices, such as daisy wheel printers or plotters.

File Servers

Both disk and file servers let you share disk space. The more restrictive disk servers (MacServe or SUN*MUFS) offer segregated file storage and do not give multiple users simultaneous access to the same disk partitions. File servers, such as AppleShare, 3+, and TOPS, allow more than one user to access the same file in the same volume; they also manage access conflicts between users with file, record, and byte-locking features.

You have a choice of two types of file servers: centralized, or dedicated, servers; and distributed servers.

Centralized servers, such as AppleShare and 3+, require their own hardware. AppleShare uses a dedicated Mac and a hard disk, and allows you to run only one other application concurrently (usually laser spooling, modem service, or electronic mail). The 3+ system provides a server box that contains a microprocessor and a hard disk. The system not only handles file requests, but also spools print jobs for a LaserWriter, and maintains an E-mail system for the network.

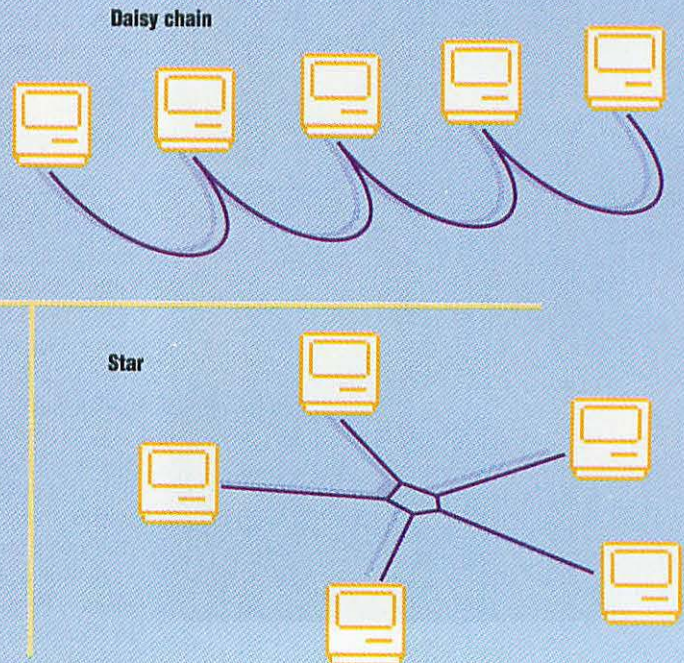
Probably the best-known example of a distributed server is TOPS. With TOPS each network node can function as a server. This means you *publish* files—you make them available to other users—on your own hard disk. The success of TOPS depends on cooperation among the members of your network. If your Mac crashes or you forget to publish some files for a joint project, then other users won't have access to the data.

Print Servers

Network print servers help avoid the frustrating delays built into PostScript-based printers. You can take one of two approaches to print spoolers (see "Speaking of Spoolers," *Macworld*, June 1987). The most common is to install a localized print spooler, which uses part of the RAM and the hard disk of your Macintosh to store the print file. The spooler takes over the job of communicating with the LaserWriter while you proceed to another task. The second approach involves installing a centralized print spooler, or buffer, which accepts and stores the printing information. The buffer then tells your Mac that it has finished the print job, which leaves you free to continue working while

Figure 1

The three fundamental network topologies are the daisy chain, trunk (or bus), and star. Apple's LocalTalk only supports the daisy-chain topology, while Farallon's PhoneNet supports all three topologies. You can configure a star topology as active or passive. Active stars use a controller, such as DuPont's fiber-optic Concentrator, or a special isolator/repeater, such as Farallon's StarController, in the hub of the star. (For a passive star the box at the hub would simply have all five branches connected together.)



the buffer interacts with the LaserWriter. Most buffers hold more than one printing job in a queue.

Centralized spoolers offer network users more advantages than localized spoolers. With localized spoolers, you regain control of your Mac more quickly, but you still compete with the other users on the network to get your job to the LaserWriter. If you have a high-priority job you'll have to ask all other LaserWriter users to abort their printing jobs. A centralized spooler (like LaserShare, 3+, or LaserServer) stores everyone's jobs in one location (the buffer) and lets you reprioritize the queue from your Mac, without dumping any jobs. Also, as networks get larger, you may find it cost-effective to purchase one centralized buffer rather than enough copies of a localized spooler.

Modem Servers

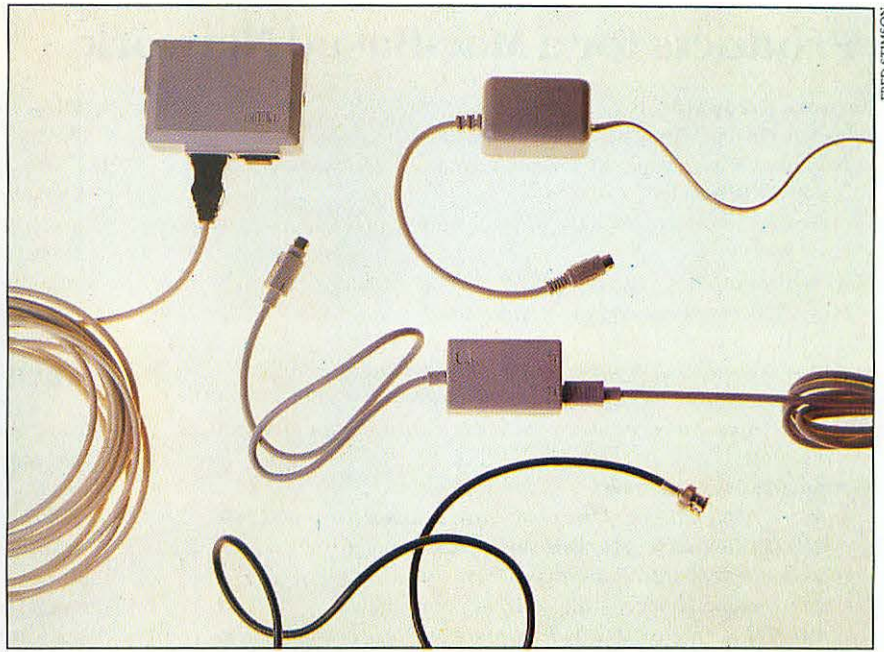
As the name implies, modem servers offer network users access to a modem. With only one modem per network, heavy modem usage may force network users to wait for access to complete their calls. One hardware-based modem server, Shiva's NetModem, provides AppleTalk access for remote users. Thus you can call your office network from the field and transmit data to your file server, or print on the office's LaserWriter. You should be aware, however, that modems operate significantly slower than LocalTalk (the NetModem operates at 1200 bps, compared to LocalTalk's 230,000 bps). Many tasks will take longer and some programs may not work at all, because of delays between transmission and system response.

Device Servers

Not every computer peripheral works with AppleTalk. You cannot directly connect some useful devices like daisy wheel printers, pen plotters, or even non-PostScript laser printers (like HP's LaserJet) to an AppleTalk network unless you use a device server. The server box is designed to connect AppleTalk on one side and a non-AppleTalk device on the other side using either serial or parallel interfaces (two servers, C-Server and MultiTalk, can each connect to more than one device). Once you've installed a device server, each networked user can access the plotter or other device as if it were directly attached to the Mac.

Building a Bridge

Heavy network traffic on larger networks can significantly degrade the system's response time. In fact, you might think you were back working on a 128K Mac. At other times it's not the number of users on the network that affects performance but the type of application being used, for example a multiuser database package. To accommodate heavy traffic, you can convert to an Ethernet-based network, or you can divide your network into smaller networks (or zones) that link together with *bridges*. Bridges are intelligent devices that connect to physical networks. A bridge re-



An AppleTalk network can be assembled using a variety of cable types: (clockwise from top left) Dupont fiber-optic cable and converter; PhoneNet adapter and twisted-pair phone wire, standard LocalTalk adapter and cable, and thin Ethernet.

stricts the flow of data between networks and prevents local data from being passed to another network.

Three products—InterBridge, I-Server, and NetBridge—let you link dissimilar media and connect two LocalTalk or PhoneNet networks in a *local bridge* configuration. You can also create *half-bridge* configurations that join a LocalTalk or PhoneNet network to Ethernet or communicate to a remote site. The FastPath boxes from Kinetics provide half-bridges to Ethernet. The Ethernet cable functions simply as a transmission medium to link two LocalTalk networks, each with its own FastPath. To send data to a branch network at a remote site, connect a bridge device to a modem and then communicate to another modem/bridge combination on the other end (see Figure 2).

Foreign Systems

Part of the peaceful coexistence between Macs and IBM PCs results from a large selection of hardware that allows you to transfer data from Macs to PCs (see "The Road to MS-DOS," *Macworld*, August 1987). A number of vendors (Apple, Hercules, Tandy, Tangent Technologies, TOPS) now offer cards that provide MS-

Products for a Mac-Based Network

Network Hardware

- AppleTalk Custom Wiring Kit/Apple Computer
Includes 100 m of cable, 26 assembly plugs, 4 cable extenders. \$650.
- AST-ICP/AST Research
Communications card for Mac II. 2 AppleTalk ports \$949; 4 AppleTalk ports \$999.
- TurboNet/Nuvotech
PhoneNet-compatible AppleTalk connector for Macs. \$49.95.
- TurboNet Adapter/Nuvotech
Connects TurboNet/PhoneNet to AppleTalk cabling. \$6.
- Concentrator/DuPont Electronics
Supports AppleTalk over fiber-optic cable; controller for linking Macs; 8 users. \$950.
- Converter/DuPont Electronics
Supports AppleTalk over fiber-optic cable; adapter for Mac. \$250.
- LocalTalk Locking Cable Kit—10 Meter/Apple Computer
Includes 10 m of AppleTalk cable. \$75.
- LocalTalk Locking Connector Kit—DB9/Apple Computer
Attaches Mac 512K to AppleTalk running on Apple cabling system; includes 2 m of cable. \$75.
- LocalTalk Locking Connector Kit/Apple Computer
Attaches Mac Plus—Mac II to AppleTalk—includes 2 m of cable. \$75.
- Passive Star Wiring Kit—DIN8/Farallon Computing
Punch-down block to support up to 6 branches in a wiring closet. \$95.
- PhoneNet Plus Connector/Farallon Computing
Connector for attaching Mac (or other device) to AppleTalk on phone wire. \$59.95.
- PhoneNet to AppleTalk Adapter/Farallon Computing
Allows both LocalNet and PhoneNet connectors on same network. \$9.95.
- Q-Talk/QMS, LaserConnection
Connector for attaching Mac (or other device) to AppleTalk on phone wire. \$49.

Ethernet

- EtherPort II/Kinetics
NuBus card for Mac II; connects to Ethernet, supports EtherTalk and TCP/IP. \$795.
- EtherPort SE/Kinetics
Interface card for Mac SE; thick- and thin-wire connections. \$795.
- EtherSC/Kinetics
Interface box for Mac with SCSI port; thick- and thin-wire connections. \$1250.
- FastNet/Dove Computer
Interface box for Mac with SCSI port; thick- and thin-wire connections. \$1498.
- FastPath/Kinetics
Ethernet gateway for AppleTalk network; thick-wire connection; 31 users. \$2500.
- FastPath 3/Kinetics
Ethernet gateway for AppleTalk network; thin-wire connection; 31 users. \$2750.
- Macintosh II EtherTalk Interface Card/Apple Computer
Interface card for Mac II; thick- and thin-wire connections. \$699.

File Servers

- 3+ for the Mac/3Com
Requires 3Com server; interfaces to PCs using 3+. \$495.
- 3S/200/3Com

File server (106MB hard disk) plus processor; 2MB RAM; server software. \$7995.

- 3S/201/3Com
File server (see 3S/200 description); includes 60MB tape backup. \$9745.
- AppleShare/Apple Computer
File server; requires dedicated Mac and hard disk; 50 users. \$799.
- Giga Tower/NuData
File server; includes hard disk (300MB to 1.2 gigabytes) plus Mac II and color monitor. \$18,950—\$28,000.
- MacServe/Infosphere
Disk server for any Mac and hard disk. \$250.
- MARS2/Micro Dynamics
Document server and archival system; uses WORM drive. \$15,000.
- TOPS/Macintosh/TOPS
Distributed file server; includes print spooler and format translator. \$189.

Print Spoolers

- LaserServe/Infosphere
Background LaserWriter print spooler for individual Macs. \$95.
- LaserServer/DataSpace
Centralized LaserWriter spooler. \$2295.
- LaserShare/Apple Computer
Designed to complement AppleShare. \$299.
- LaserSpeed/Symantec, Think Technologies Division
Local spooler for LaserWriter. 1 user. \$99; 5 users \$495.
- SuperLaserSpool/SuperMac Software
Local spooler for LaserWriter and ImageWriter. 1 user \$149.95; 5 users \$395.
- TangentSpool/Tangent Technologies
LaserWriter spooler and PC AppleTalk card; 30 users. \$600.

Modem Servers

- ComServe/Infosphere
Uses Mac to control access to shared modem. \$195.
- ModemShare/Mirror Technologies
Uses Mac to control access to shared modem. \$200.
- NetModem V1200/Shiva
Shareable modem with direct AppleTalk connection; supports remote access to AppleTalk network. \$599.

Device Servers

- C-Server/Solana Electronics
3-port RS-232C server. \$645.
- MacAccess/Inventab
1-port RS-232C server. Price TBA.
- MultiTalk/Abaton
3-port RS-232C server. \$695.
- NetSerial X232/Shiva
1-port RS-232C server. \$399.
- R-Server/Solana Electronics
Asynchronous remote access to AppleTalk network. \$595.

Bridges

- I-Server/Solana Electronics
Direct bridge. \$695.

InterBridge/Hayes Microcomputer Products

Direct bridge, or half-bridge with 2400-baud (or faster) modems. \$799.

NetBridge/Shiva

Direct bridge. \$399.

Repeaters

IPT NetRepeater/Information Presentation Technologies

Strengthens AppleTalk signals; permits longer distance between Macs. \$249.

PhoneNet Repeater/Farallon Computing

Increases maximum allowable distance between nodes. Price TBA.

PhoneNet StarController/Farallon Computing

Supports 12 electrically isolated branches in star topology. \$1695.

TOPS Repeater/TOPS

Strengthens AppleTalk signals; permits longer distance between workstations. \$189.

MS-DOS Connections

AppleShare PC/Apple Computer

Supports PC access to AppleShare file server; requires AppleTalk interface card. Price TBA.

AppleTalk PC Card/Apple Computer

AppleTalk interface card for PCs. \$399.

PC MacBridge ATB/Tangent Technologies

AppleTalk interface board for PC, includes printer driver. \$250.

PC MacBridge Plus/Tangent Technologies

PC MacBridge ATB, PSPrint, and MailBox; for PC. \$450.

PC MacServe/Tangent Technologies

Supports PC access to MacServe disk-sharing software. \$100.

Network Card Plus/Hercules Computer Technology

PC video card with AppleTalk support; based on RamFont card. \$395.

TandyLink/Tandy

AppleTalk interface card for Tandy PCs. \$120.

TangentShare/Tangent Technologies

Supports PC access to AppleShare file server; requires AppleTalk interface card. \$150.

TangentShare Bundle/Tangent Technologies

PC MacBridge ATB, TangentShare software, PC MacTxt. \$350.

TOPS Flashcard/TOPS

AppleTalk interface card for PCs; supports 770,000-baud AppleTalk between PCs. \$239.

TOPS NetPrint/TOPS

Enables IBM PCs to print directly to LaserWriters on AppleTalk; requires AppleTalk card for PC. \$189.

TOPS/DOS/TOPS

Distributed file server software for MS-DOS; requires AppleTalk card. \$189.

File Translators

Apple File Exchange/Apple Computer

Free.

CADMover/Kandu Software

\$495.

MacLink Plus/Dataviz

\$195.

PC MacTxt/Tangent Technologies

Handles Wordstar or DCA file conversions to MacWrite; PC and Mac programs. \$50.

Electronic Mail

InBox/Symantec, Think Technologies Division

Starter kit supports mail server and 3 users. \$350; \$125 for additional users.

InBox/PC/Symantec, Think Technologies Division

Links a PC to the InBox mail system. \$195.

Microsoft Mail/Microsoft

Electronic mail system for Macs; includes server software and desk accessory. 1-4 users \$299.95; 5-10 users \$499.95; 11-20 users \$749.95; 21-32 users \$949.95.

MacMail/Aegis Development

Network chat system; not a store-and-forward mail system. \$39.95.

Mail Center/Videx

Electronic mail with server and user applications. 2 users \$299; 6 users \$499.

MailBox/Tangent Technologies

Links PCs to Videx Mail Center. \$50.

MegaTalk Plus/MegaGraphics

Mail system only for MegaScreen users. 2-6 users \$249; 7-12 users \$349; 13-18 users \$449.

Multiuser Databases

4th Dimension/Acius

\$695.

Détente Reports/WOS Data Systems

Generates reports from dBase III files on PCs using TOPS. \$189.50.

Inside Out/Shana Enterprises

Development tools for multiuser databases. \$595.

Multiuser Helix/Odesta

3 users \$695; \$100 for each additional user.

Omnis 3 Plus Multi-User/Blyth Software

2-5 users \$990; 6-10 users \$1785; 11-20 users \$2474; more than 20 users \$2995.

WOSbase/WOS Data Systems

1 user \$195; 2-45 users \$495.

Network Software

PhoneNet CheckNet/Farallon Computing

Includes RegisterName and CheckNet for testing workstation connections. \$29.

Timbuku/WOS Data Systems

Allows networked user to take control of another Mac. \$99.95; 2 users \$189.50; 8 users \$495; 12 users \$895; 24 users \$1650.

TrafficWatch/Farallon Computing

Dynamically monitors network traffic; includes spreadsheet macros for analysis. \$195.

Other Software

Multi-User Appointment Diary with Smart Alarms/Imagine

Multiuser calendars and scheduling. \$149.95 plus \$10 per node.

PictureBase Network Package/Symmetry

Multiuser pictorial database; 3 users \$150.

DOS computers with LocalTalk support. You can also find file servers that work with both Macs and PCs. For example, 3Com designed 3+ to support both Mac and MS-DOS machines with the same functionality (file servers, print spooling, and E-mail). TOPS versions exist for both the Mac and MS-DOS (and OS/2), and MS-DOS computers can access AppleShare using either AppleShare PC from Apple or TangentShare from Tangent Technologies.

To exchange data transparently between Macs and PCs, you'll need translation software. Some programs let Macs and PCs read each other's files. For instance, Microsoft Excel can read Lotus 1-2-3 files from a PC (via TOPS, for example), and McMax reads dBase III files. Programs such as Aldus's PageMaker trade files between the Mac and PC versions.

If a product does not include built-in translation tables, obtain a file translator program, such as Apple's File Exchange or Dataviz's MacLink Plus. Apple's program is free from your dealer, but it currently handles only a few file formats (such as DCA/RFT and MacWrite). On the other hand, MacLink Plus works with programs such as 1-2-3, Multiplan, MultiMate, WordStar, and dBase on the PC, and MacWrite, Jazz, Excel, and Microsoft Word on the Mac. TOPS now includes MacLink Plus as its file translator program.

Software for the Network

Next to sharing files, it seems that network users always want to trade messages via electronic mail. E-mail systems such as InBox and InterMail store messages meant for you and alert you to incoming mail. They usually work in the background, allowing you to send and receive mail without quitting the program you're currently using. Limited E-mail programs let you exchange messages only if both Macs are on and connected to the network. In some cases, you also have to be using the same application.

Work groups frequently need to update or retrieve information from a common data file. Multiuser databases permit more than one user to work with a database at the same time. Usually work groups store database files on a centralized file server, and each user owns a copy of the database application. Several multiuser databases have been written specifically for the Macintosh, such as 4th Dimension and Multi-User Double Helix. Other databases, such as Omnis 3 Plus, also run on MS-DOS machines. If you need access to dBase III files, you can use a database such as Detente Reports. Although most multiuser databases predate the introduction of AppleShare, manufacturers have upgraded these products to take advantage of the record- and byte-locking features found in Apple's AppleTalk Filing Protocol.

Some network programs help you diagnose problems you encounter in installing and maintaining an AppleTalk network. One of the first steps in monitoring the network is to find out who's on it. PhoneNet CheckNet lets you identify each computer by a specific

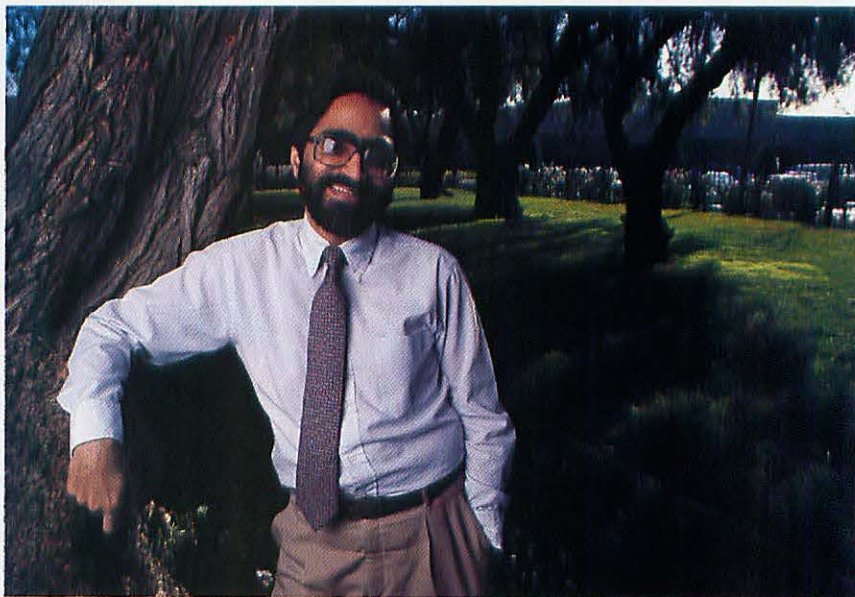
name and see just who's out there on the net. You can often locate a break in the network simply by determining which network node can't "see" the others. Another program, TrafficWatch, surveys the traffic between nodes and saves the results for later analysis in Microsoft Excel. In reviewing the traffic patterns, you may discover that one person, or device, generates or receives an undue amount of traffic. Occasionally you'll uncover wiring problems that produce a high number of transmission errors.

Starting from Scratch

A small network begun for a work group can expand to handle an entire building's or division's needs. Start by setting up a small network for four to ten people with Apple's LocalTalk cabling system or Farallon's PhoneNet. Use a centralized or distributed file server to transfer information. If you need E-mail, both InBox and InterMail are good choices.

As you add nodes, network traffic increases, and the response of the network may become unbearably slow. If you can identify either logical or physical groups, divide the network into zones by putting bridges between the groups, or if Ethernet is currently installed, use Ethernet as the backbone between the local networks.

Expanding your network may mean adding remote workstations on other floors. Obtain either re-

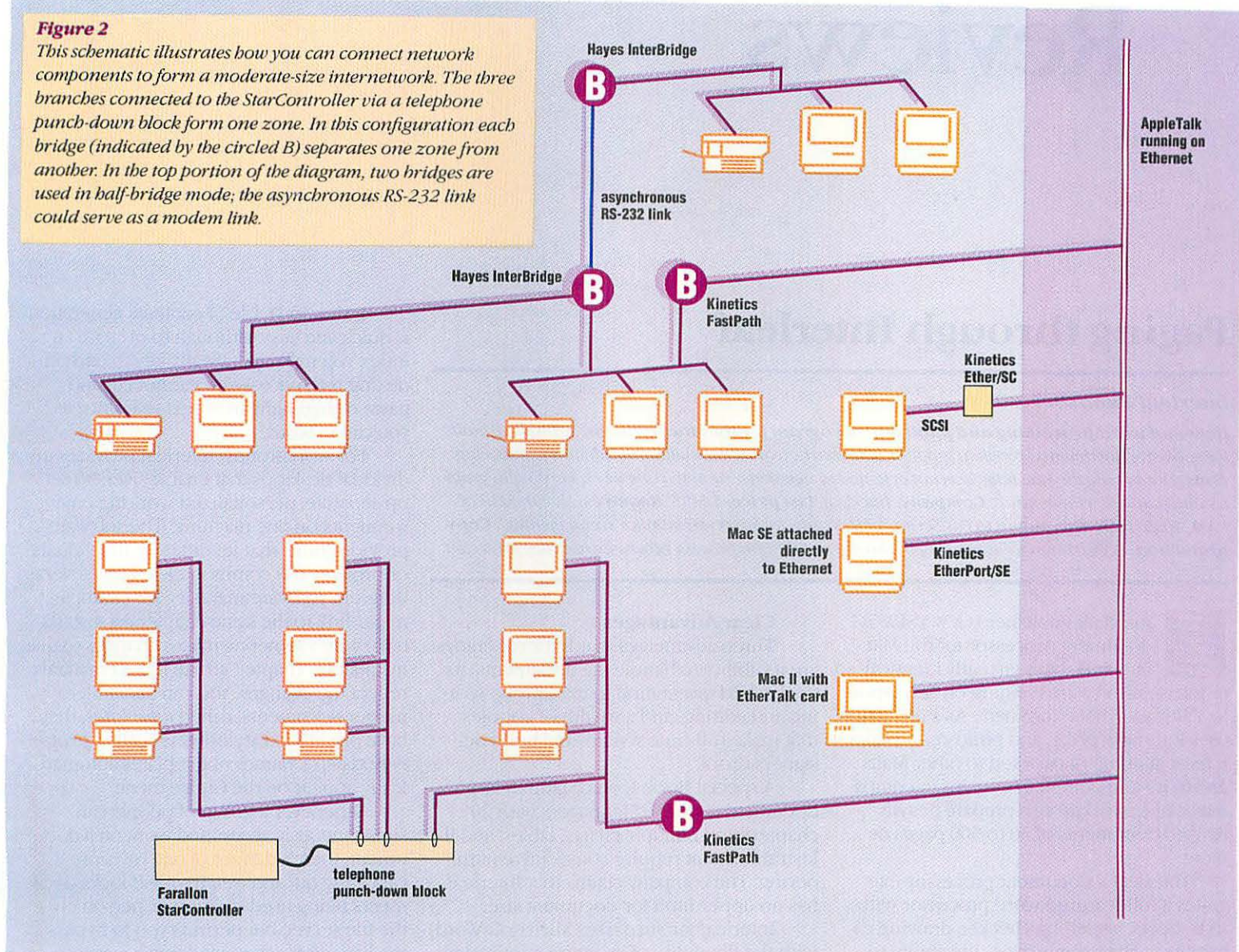


Gursbaran Sidhu, manager of network systems development at Apple, was the chief architect of the AppleTalk system.

ED KASHI

Figure 2

This schematic illustrates how you can connect network components to form a moderate-size internetwork. The three branches connected to the StarController via a telephone punch-down block form one zone. In this configuration each bridge (indicated by the circled B) separates one zone from another. In the top portion of the diagram, two bridges are used in half-bridge mode; the asynchronous RS-232 link could serve as a modem link.



peaters or the StarController to extend the network's size, or chain StarControllers together and use repeaters too. The StarController also includes useful diagnostic and network-control software as part of the package.

Network traffic can become a headache for any network administrator. It's very hard to predict just how bad network response may become from looking at a diagram. Your own experience with the network will help you determine when it's worthwhile to upgrade or reconfigure. If you require higher network speeds, consider Ethernet. But don't expect Ethernet's 10-megabyte data rate to automatically speed up your Mac's network response; Ethernet's bandwidth, however, provides a decided advantage over LocalTalk and

PhoneNet—it allows more users to send information at the same time.

The accompanying table demonstrates the number of network products available for AppleTalk. The popularity of the AppleTalk network may be based on its relatively low cost and ease of installation, but the capabilities inherent in AppleTalk's protocols give offices the opportunity to expand small work groups into complex networks that share resources across a variety of network media. □

See *Where to Buy* for contact information.

Reviews

Paging through Interleaf

Interleaf Publisher 3.0

High-end word processing and publishing program for the Mac II. **Pros:** WYSIWYG; built for book-size documents; excellent graphics and chart-creating capabilities; automatic numbering. **Cons:** Doesn't use the Mac interface; not oriented to newsletter or magazine work; kerning in graphics only; can't do runarounds. **Company:** Interleaf. **List price:** \$2495. **Requires:** Mac II; 5MB of RAM; 40MB hard disk; output to PostScript devices only; large-screen monitor recommended. **Copy protection:** Registration written to floppy during installation process; otherwise not copy protected.



Interleaf Publisher is a WYSIWYG document processor for the Macintosh II that's virtually identical to Interleaf software running on Sun, Apollo, DEC, and IBM equipment. As a result, its user interface, price, and philosophy make it most at home networked to other Macs and to its minicomputer cousins in companies where workgroups prepare heavily revised documents of 50 to 500 pages or more.

Interleaf's document processor integrates a full-featured word processor with stylesheets, a spelling checker, drawing capabilities, chart generation, the ability to edit and incorporate TIFF scanned-image files, and the ability to output to PostScript laser printers or typesetters. It is much more a super word processor built for publishing large documents than it is an electronic light table for creating advertisements and newsletters. Its closest competitor on the Macintosh is probably Microsoft Word. Page-makeup software—such as PageMaker, ReadySetGo, and Quark XPress—approaches document preparation from a page-by-page layout perspective that is foreign to Interleaf.

Interleaf has more features than either Word or the page-makeup packages, and its interface differs vastly from any of them—and from the Macintosh norm.

Clear Advantages

Three advantages that Interleaf enjoys are its ability to handle big documents, its unabashed orientation to workgroup writing and editing, and a wealth of goodies that make full-time writers and book designers drool.

A special Book Icon organizes large documents—those 500-pagers with 20 chapters and multiple charts, tables, and illustrations that require consecutive numbering. The company claims that Interleaf has no upper limit for document size.

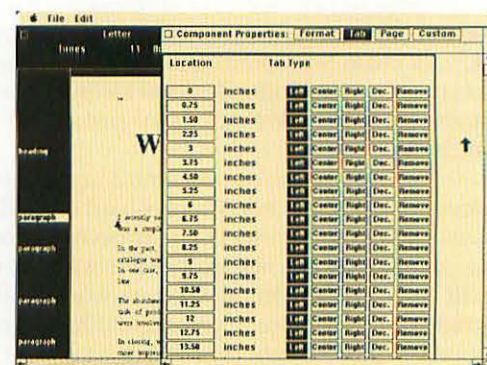
Interleaf far surpasses Microsoft Word with the flexibility of its figure numbering and text references. For example, Word can't number the sequence Figure 3.5, Figure 3.6, and so on. Interleaf can. Interleaf also maintains correct numbering across files automatically, and can anchor tables and graphics to text so that when you move the text—even with a cut and paste between files—the graphic goes too. Text references change automatically as you add and delete figures.

Chapters print in the order in which their document icons appear within the Book Icon. Organizing a big printing task is a matter of moving icons around in a window.

Index and table of contents generation is quick and easy, although to prepare an index you must specifically key in each indexing reference—you cannot cut and paste or highlight an in-text reference as you can in Word.

For workgroups, Interleaf provides individual desktops that enable users to set up separate, personalized working environments on one machine. The software provides links that let different individuals or projects use common files. Thus several different software manuals, for example, might link to the same chapter on installation. When someone makes changes to that installation chapter, all the linked manuals reflect the changes. You can also link to master documents, called *templates*, that have predefined stylesheets (called *property sheets*). Names of templates automatically appear on the Create menu.

Whenever a group of people can simultaneously access and work on a document, there's danger of one revision canceling out another. Interleaf locks documents being used by another person on the file server, but permits you to bypass the lock after acknowledging a warning. You can mark new or revised text automat-



Setting Interleaf Tabs

Interleaf tab settings are table driven, as are all format features in the program. This approach differs from most other Mac software, where you can click and drag tabs or other settings.



ically with any combination of underlining, strikethrough, or revision bars beside the paragraph.

Interleaf's property sheets define paragraph, font, and column formats, much like stylesheets in Microsoft Word. But they go further. For example, you can specify that the program balance column heights on multicolumn pages by making minute adjustments in the spacing between lines, and you can specify that adjustment factor.

You can import files from MacPaint, MacDraw (PICT and PICT2 files), TIFF (for scanned images), ASCII, Microsoft's Rich Text Format (RTF), and encapsulated PostScript (EPS). You must first save Microsoft Word files in RTF before importing them to Interleaf. Interleaf exports only to its own file format and ASCII.

The program's internal drawing capabilities are close to those of the original MacDraw, but work via menus rather than a tool palette. Drawing features include a zoom (magnifies 16 times) and contrast editing for images. The table-driven chart generation is as complete as many charting packages.

Interleaf's display preference is decidedly for large screens. On a 19- or 21-inch monitor, Interleaf shows a full page with room for other program icons left over. On the Mac II's 12-inch monochrome monitor, the program shows a partial page. In keeping with its book orientation, Interleaf does not show two pages side by side.

In layout, Interleaf's mission is to create documents that are uniform throughout—a book approach, rather than a magazine approach. You can interrupt this regular sequence of text and the graphics anchored to text with a *microdocument* of

up to one page in size. A microdocument mingles text and graphics on the page any way you want. You can edit the text and graphics; but text does not flow into the microdocument, or between microdocuments, automatically. You cannot do a runaround layout except within a microdocument.

Microdocuments act as exceptions to any book design you create. You could use them to embed an annotated map in the middle of a chapter, for instance. Although you can use microdocuments to design newsletters and advertisements, doing so to produce a design-intensive newsletter or magazine is really a misuse of the program.

Obvious Differences

In order to maintain compatibility between Interleaf on the Macintosh and Inter-

leaf running on other workstations, the program works and acts differently from other Mac products. In moving from Interleaf's standard three-button mouse to the Mac's one-button mouse, Interleaf relies on the \mathbb{H} and Shift keys to augment the mouse button.

But the Interleaf user interface ignores some of the Mac world's hard-won knowledge. Interleaf settings are all table-driven: for every tab location, for example, you fill in a number on a table and click a button showing the kind of tab you're entering. In Word, a click on a ruler is enough to enter a tab.

When preparing an index, you must key in each word to be indexed. You cannot copy and paste from existing text, nor mark existing text as an entry. In a large document—the Interleaf specialty—preparing index entries can quickly become laborious. Once you have prepared the index entries, actually generating the index is easy.

In the drawing facility, there is no tool palette. You must choose arcs or lines or whatever from a menu. Again, this procedure is different from what Macintosh users expect (see "Creating Interleaf Graphics").

Interleaf lacks some features that standard page-layout packages have. Interleaf provides no kerning, cannot flow text around the outside of a graphic (except in a microdocument), and does not allow a search for a typeface embedded in text (the next italic word, for example).

Peaceful Coexistence

Interleaf can coexist with other Macintosh software on your hard disk, with cer-

tain caveats, but you'd be advised to have as large a hard disk as possible. Upon installation of its 16 floppies, Interleaf absorbs 14MB of disk space. It grows. Also, you must run Interleaf under the Finder—not MultiFinder.

Installation takes about 20 minutes. The *Macworld* test installation encountered a bad disk. A blind call to Interleaf's customer support brought a replacement set of disks the next day via Federal Express. Support costs \$200 per year after the first 60 days, entitling you to ten hours of phone calls on Interleaf's toll-free number.

Interleaf is best installed in the root directory of a hard disk, although you can install it elsewhere. Be forewarned: Interleaf creates many small files. For good housekeeping, either dedicate a Mac II to the program, or create a special directory for Interleaf.

No other software available for the Macintosh is as well adapted to workgroup writing and editing as Interleaf. Its \$2495 price may make it most practical for full-time writers, editors, and book designers; but Interleaf offers volume discounts that can make the program attractive to companies. While its look-and-feel is less comfortable than more familiar programs, such as Microsoft Word, Interleaf is unquestionably the most powerful long-document preparation package available on the Macintosh. Perhaps exposing Interleaf to Macintosh users will result in changes to Interleaf software, and exposing Mac users to Interleaf may influence what users demand from their publishing software.

—Jeff Walden

See *Where to Buy* for contact information.

Working in the 4th Dimension

4th Dimension 1.0.4

Database and application generator:

Pros: Includes powerful procedural language; performs fast searches; few limitations; Multi-Finder aware; good use of Macintosh interface; good technical support. **Cons:** Requires knowledge of programming to create calculated or validated fields and complex applications; displays only one form at a time; slow data import/export; poor documentation; marginal performance on Mac Plus or SE. **Company:** Acius. **List price:** \$695. **Requires:** 1MB; Mac II with 5MB and fast hard disk recommended. **Copy protection:** None.

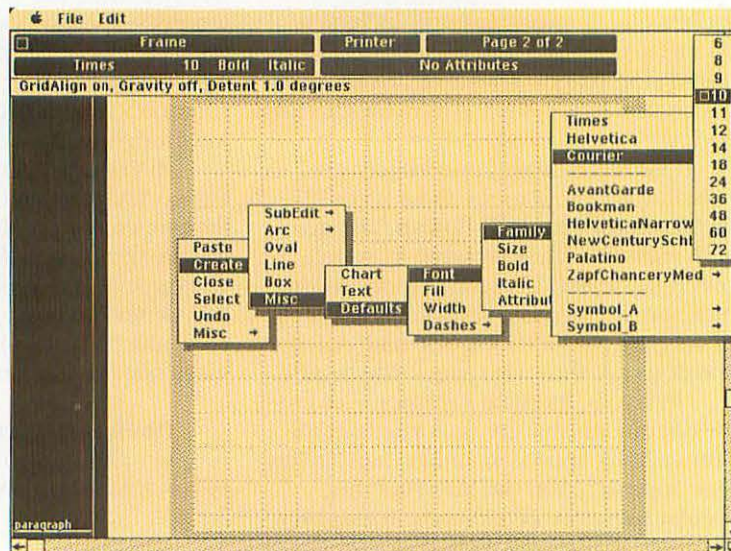


Until the debut of 4th Dimension, developers unwilling to construct a relational database from scratch were forced to choose between two application generators with very different personalities: Blyth Software's character-based Omnis 3 Plus and Odesta's icon-rich Double Helix. 4th Dimension encompasses the best of both these programs by combining the Macintosh user interface with an extremely powerful Pascal-like procedural language. 4th Dimension has all the power and flexibility required to develop custom applications capable of handling nearly any data-management task. In addition, the program lets you search, sort, and run procedures in the background when operating under MultiFinder.

4th Dimension provides separate environments for designing and using a database. The design environment allows you to create a database whose structure is visible (see "The Structure Window"). A file structure can contain up to 99 files, with each record containing up to 511 fields. To link files you simply draw lines connecting their icons. In the design mode you can also create procedures (programs) and custom menus, assign password protection, and build sophisticated form layouts using a MacDraw-like editor (see "Layout Design"). With these tools it's easy to design a relational database with Mac-like features. It's possible to build hundreds of different forms with controls like buttons, check boxes, graphics, and scrollable areas.

Creating Interleaf Graphics

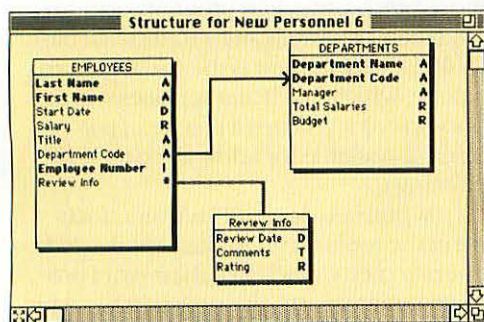
To control graphic shapes, Interleaf provides pop-up menus, rather than the almost-universal Macintosh tool palette. Pop-ups have the advantage of appearing anywhere on a large screen.



In the user environment you can enter, retrieve, or search data or create simple reports without writing programs. Data can be imported or exported from or to SYLK, DIF, or ASCII formatted files via a single menu command. One drawback of the user environment, however, is that you cannot create calculated fields without writing a program. In addition, 4th Dimension can only display one form at a time (Double Helix II can display numerous forms simultaneously). This restriction seems incongruous in a database that has few limitations and otherwise makes good use of large display monitors (for instance, by allowing you to resize screens).

Finally, 4th Dimension provides a custom environment in which you create user interfaces that are virtually indistinguishable from those of a stand-alone application. Acius offers a run-time module, for about a tenth of the cost of 4th Dimension, that lets you use this customized front end. Databases designed to work as run-time modules perform flawlessly when accessed through a network by several operators simultaneously.

To create sophisticated programs with 4th Dimension, you'll need to master writing procedures—the miniprograms that



The Structure Window

In Design mode, you create files and establish links. The solid arrow defines a relational link between the Employees file and the Departments file. The gray arrow defines a subfield.

tie everything together. For example, buttons, menus, and check boxes incorporated in your forms won't do anything unless you link a procedure to each. You'll also need procedures to validate data, look up data in other files, or post data from one file to another. Although 4th Dimension will write a procedure to link data in one file to another automatically, you'll find that such procedures typically require substantial modification. Writing procedures to create simple applications is relatively easy,

Layout Design

With 4th Dimension, you modify one of eight predefined layouts or create your own. You can cut and paste the forms you design from one layout to another or store such forms in the Scrapbook. To embed graphics, simply paste or drag them into position.

but you'll need programming skills, and you'll have to do a fair amount of debugging, to make full use of 4th Dimension's capabilities. Experienced programmers should have no difficulty grasping the essentials from the manuals and the example applications, but users unaccustomed to programming may find 4th Dimension to be more than they can handle.

The very powerful language behind 4th Dimension includes both local and global procedures and variables as well as most of the commands and constructs you would expect in an independent programming language. The language also provides tools to handle communications using the serial port. An editor lets you enter or edit lines of code either by using the keyboard or by selecting files and operators from scrolling lists displayed on screen. Once entered, the code is automatically indented, and keywords and routines are formatted in boldface. Whenever the program executes procedures, an in-line debugger intercepts errors and immediately displays the portion of code that caused the error. You can then either abort the procedure or continue in a single-step mode. In contrast to a nonprocedural, iconic language like the one used by Double Helix II, 4th Dimension allows you to write procedures that you can then transport via the Clipboard to other locations either within a single application or between applications. It's easy to assemble collections of procedures that you'll use over and over again.

Performance

The most glaring problem with the first release of 4th Dimension is the almost unbelievably slow pace with which data is

imported or exported. The program imports data at a rate approximately ten times slower than that of Double Helix II. Importing 5000 records of modest size can take more than a hour. Operations that globally modify or update the contents of fields in records are also quite slow. In order to maintain data integrity, 4th Dimension normally forces data to be written to disk after each new record is created or modified. While this ensures virtually no data loss in the event of a crash or power failure, it also slows data import.

For almost all types of searches, however—for example, on indexed fields, on nonindexed fields, and for multiple-condition searches—4th Dimension is quite speedy. In my tests using a 6000-record database, 4th Dimension was faster than either Omnis 3 Plus or Double Helix II. However, 4th Dimension's overall performance on the Macintosh Plus and SE is only marginally acceptable. To really shine, the program needs either a Mac II or a Macintosh Plus or SE with a 68020 accelerator card. A fast hard disk is a necessity no matter what kind of Macintosh you use. Acius plans to release a free upgrade (version 1.1) with drastically improved performance (a preliminary demo version imports nearly ten times as fast as version 1.0.1 or 1.0.4).

Another limitation is that 4th Dimension requires 8 bytes of RAM for every record (the size of a database isn't important except for considerations of disk space). If you're using a Macintosh with 1MB of RAM, that limits a database to between 50,000 and 100,000 records. An 8MB Mac II raises the limit to approximately 1 million records.

4th Dimension's powerful internal language enables you to achieve effects

and implement functions not possible with any other database. Furthermore, you can write procedures in any language that creates machine code and link this code into 4th Dimension. A number of these external procedures are available from Acius or on CompuServe.

Documentation and Support

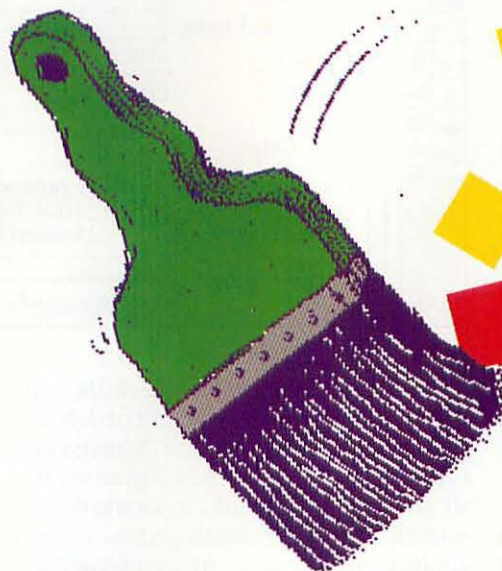
Although 4th Dimension's documentation is attractively packaged, there's definitely room for improvement. No online help is available from within the application; instead you must refer to the four manuals, which total nearly 1200 pages. Although the tutorial manual does a satisfactory job of introducing the program, it doesn't lead you through all the steps required to build a complete application. The User's Guide covers the different editing tools and various aspects of the user environments, but does not specifically address topics like building calculated fields. And, even though the manuals are indexed, finding things often takes longer than it should.

Acius's technical support has gradually improved—it is now among the best in the industry. A hot line (not toll free) provides unlimited free assistance. In addition, Acius representatives and other developers can be readily accessed on CompuServe (Go Appvend; Subtopic 2 and DL2). Acius has already published more than 50 technical notes to supplement the manuals. The company offers a full-fledged support program for professional developers at \$695 per year.

A Rich Rival

4th Dimension provides a rich development environment rivaling the best database software for minis or mainframes. Developing a full-featured database application using 4th Dimension, however, requires considerable programming skill. Fortunately, Acius's technical support should help bring any serious developer up to speed in a few weeks. With the initial release reviewed here, you'll need high-powered hardware like the Mac II to achieve adequate performance with complex databases. However, Acius has promised a free upgrade with greatly improved performance. Overall, 4th Dimension is an impressive application generator that takes full advantage of the best features of the Macintosh.—*David L. Foster*

See *Where to Buy* for contact information.



A Carnival of Color

PixelPaint 1.0

Color paint program. *Pros:* Excellent user interface; dozens of impressive special effects.

Cons: Tools don't automatically scroll screen.

Requires: Mac II. *Company:* SuperMac Software. *List price:* \$495. *Copy*

protection: None.



It's hard to be objective when you're in love, but I'll try. I must confess that when I started up PixelPaint, it was love at first sight. SuperMac's program has everything I ever wanted in a color paint application—and then some. OK, enough gushing already.

The Tools

Simply speaking, PixelPaint is a color bitmapped graphics program for the Mac II. You can create graphics with the program or import drawings from applications such as MacPaint, MacDraw, or Adobe

Illustrator and add color to them.

But PixelPaint can't be described simply; the program has too many features to cover adequately in a review of this size. I'll do my best to cover important features, however (for another look at PixelPaint, see "Live and in Color," *Macworld*, February, 1988).

PixelPaint's user interface is quite similar to that of MacPaint (or FullPaint or SuperPaint); anyone familiar with one of those black-and-white programs can immediately use PixelPaint's traditional basic tools. Notably absent is the usual pattern palette, which PixelPaint replaces with a pop-up color palette (a palette of patterns is available for adding texture to a painting).

When you open a PixelPaint document the tools are in Normal mode, and operate pretty much like their paint program counterparts: the pencil draws a pixel-wide line, the paint bucket fills an enclosed area, and so forth. But clicking on the box labeled Normal Tools toggles into Special Effects mode, where PixelPaint really shows its stuff. In this mode, a menu appears for each drawing tool, offering a selection of appropriate special effects. The Brush menu, for example, lists 16 options. Among them, Maximum paints on black only, useful for colorizing images pasted in from black-and-white programs; Minimum paints on white only, letting black areas show through like a watercolor wash; Push nudges the area beneath the brush in one-pixel increments; Shadow produces a gray duplicate of the brushstroke, offset by a distance and angle you

choose; Smooth softens sharp edges; Charcoal, Wash, and Shade enable you to tint a drawing in various ways. As you can see, PixelPaint isn't merely a color version of MacPaint—it takes a quantum leap in functionality.

Other tool improvements indicate the care that went into PixelPaint's design. A few examples: you can adjust the size and shape of the paintbrush and spray can; several polygons are available, from a triangle to an octagon; the arc tool lets you combine line segments into splines or bezier curves; the angle formed by two straight lines can be constrained in increments of 15 degrees; the eraser tool erases to black, white, or the background color; pressing the Shift key causes the lasso to select an area of contiguous pixels, even if the selected shape sits on a background of another color. Another thoughtful touch is optional pop-up menus in the Special Effects mode, saving you the trek across a large monitor to the menu bar while you're using a tool. The list goes on.

Color Options

PixelPaint's color selector lets you set a painting's foreground and background colors from a palette of 256 colors. In addition, you can specify a blend and take advantage of the program's fill effect. To use the fill effect, you specify a beginning and an ending color, enter the Special Effects mode, and select a tool such as the paint bucket. When you pour paint from the bucket, the resulting range of colors forms a transition, also called a *fill* or a *blend*, between the starting and ending colors, including all the colors in the palette that fall between the two selected ones. For example, a blend from yellow to red in the default palette includes numerous intermediate shades of orange (see "Painted Pixels"). As with other PixelPaint effects, fill options abound; a dialog box lets you choose attributes such as the fill direction: top to bottom, right to left, center out, angled, and so on.

Depending on the palette and the range of colors selected, fills can be marred by color banding—distinct bars of color rather than a smooth transition. Fortunately, you can correct this problem by altering a palette's colors. More important than fixing fills, the ability to edit a pal-

ette's colors enables PixelPaint artists to create a custom set of colors for any picture. If the 12 built-in palettes don't suit your needs, you can alter any color's hue, saturation, or brightness; the program automatically saves the new palette when you save the associated drawing. PixelPaint provides a direct connection to Apple's Color Picker, System software that lets you precisely adjust colors to create a custom palette of up to 256 individual colors from among the more than 16 million available on the Mac II.

With 256 colors per palette, however, you may find it difficult to match a color you've already applied to part of a painting. Fortunately, PixelPaint features a tool that makes color matching a snap. The eyedropper tool can "pick up" a color from a painting, automatically making it the selected color.

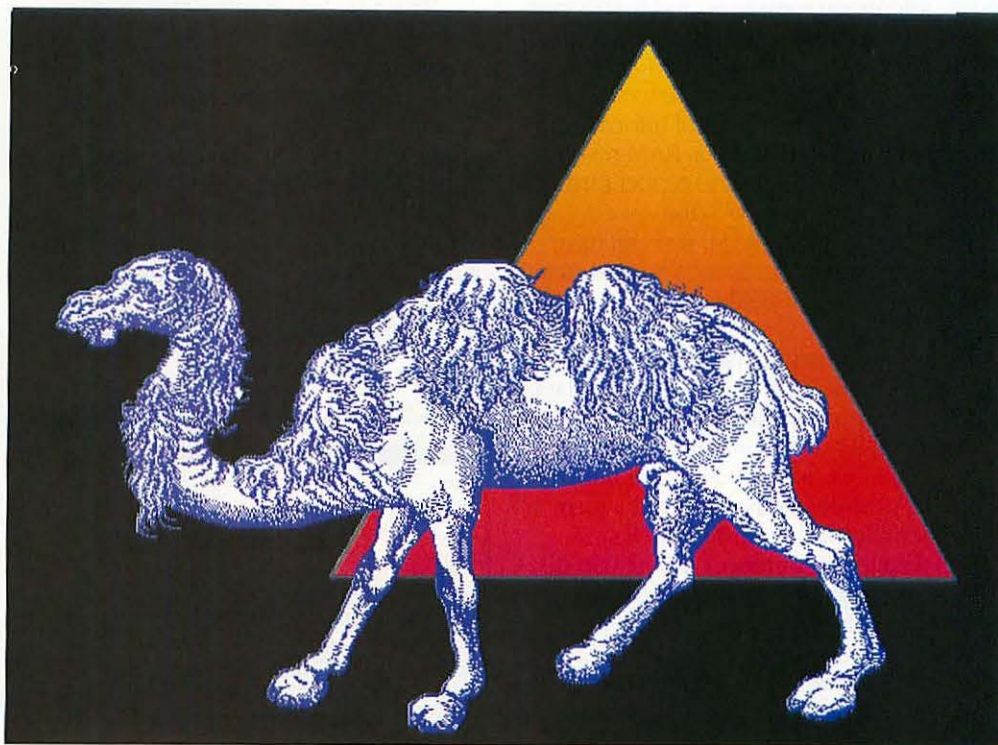
What's Not to Like?

In the interest of objectivity, I do have a few complaints about PixelPaint. It does fall behind its black-and-white predecessors in a few respects. For example, you

can open only one PixelPaint document at a time, and the tools don't scroll the document when they hit the edge of the screen, as they do in SuperPaint. I occasionally found myself wishing for features of PixelPaint's high-end cousins, such as a stencil tool or extra-large text (the program does provide 42-point versions of Times and Helvetica, but smooth renditions of even larger sizes would be useful for making color slides). Finally, I came across a relatively obscure bug: I lost a section of a document that was off screen when I pasted in an object, dragged it, then chose Undo Drag. This glitch has been duly reported to SuperMac.

If you're in the market for a color paint program, I heartily recommend PixelPaint. Of course, little competition exists at this time. Currently, the only other contender is Computer Friends' Modern Artist—a serviceable color paint program that sells for \$300 less than PixelPaint but lacks many of the latter's features. You get, as they say, what you pay for.—*Erfert Nielson*

See *Where to Buy* for contact information.



Painted Pixels

This painting makes use of two of PixelPaint's special effects. The camel was pasted from a collection of MacPaint clip art, then colored with the brush's Maximum option, which paints only on black. The pyramid makes use of the program's fill effect, which produces a smooth transition from one selected color to another.

Real-World Project Management

AEC Information Manager 1.2

Project-oriented database. **Pros:** Excellent report formatting; special date, time, and text data entry; easy to use; flexible import/export especially useful with word processing mail merge.

Cons: Only one work-resource clock calendar per file; 9-point Helvetica type on project-log input screen is too small on high-dpi monitors.

Company: AEC Management Systems. **List price:** Version 1.21 \$695. **Requires:** 1MB. **Copy protection:** None.



Unlike traditional project-management programs such as MacProject or Micro Planner Plus, AEC Information Manager has no algorithms to calculate critical paths or to optimize resource scheduling. Rather, it organizes the practical side of project management.

A typical project manager's desk is a jumble of loose correspondence, reminder notes, telephone messages, and hastily prepared and updated reports and schedules. AEC Information Manager provides a flexible, project-oriented database to store, retrieve, and report this kind of information. And because the program is RAM resident, holding all project data and report formats in memory, it provides blazing speed. Depending on available RAM, you can have many files open at once, each with as many records per file and fields per record as needed.

AEC Information Manager has three modes for working with files: design, data entry, and report. In design mode, you add or modify field names and specify what type of data can be stored in each field. In data-entry mode, fields appear in a form that resembles index cards, which simplifies data input. In report mode, you define tabular report formats to view all or some of the data.

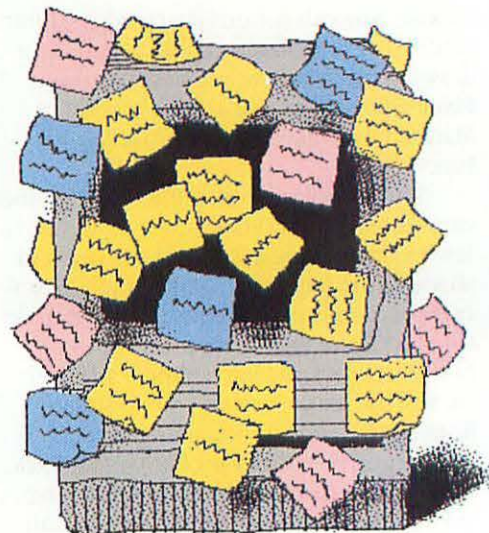
Real Power

The real power of AEC Information Manager begins to show when you define a field as one of five special types: Project Log, Submittal Log, Address, Note Pad, or List of Text. Unlike the standard database numerical, text, date, and time fields, which hold only a single value, these special fields hold a variety of data. When you

click the cursor in one of these fields a secondary data-entry window pops up. For instance, clicking on the List of Text field opens a scrollable text window in which each line is an entry in a sortable list. This makes it a breeze to relate a variety of facts to a single record, compared with the more structured approach of a relational database.

The Project Log and Submittal Log are the heart of the program's project-management capabilities. Once you have established the order of events for the project, the Submittal Log enables you to keep a running journal of jobs that are going out or coming in. You enter start or end dates, duration, and status notes. The Project Log is similar to the Submittal Log but tracks projected progress, rather than actual progress. Both types of logs perform task start, finish, or duration calculations based on a user-definable calendar that specifies the hours and days worked each week. Together with the program's alarm, which can be set to remind you of important dates, Project and Submittal logs make it easy to plan and administer all project activities and correspondence.

The AEC Information Manager report generator is outstanding. To create a report format, simply choose among numerous options. For example, calendar and numeric data can appear as horizontal bar graphs. You can select the size, shape, and fill pattern of project start and end points and connecting duration lines. Bar graphs and date lines can be mixed with columns of numeric data and text, word-wrapped to as many lines as required. This flexibility closely imitates the way people create re-



ports by hand, thereby making it easy to generate reports that are impossible to create using traditional Macintosh database programs.

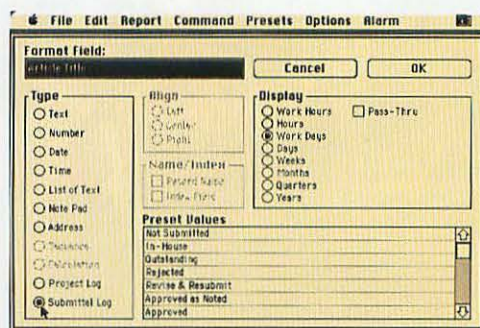
AEC Information Manager also provides highly flexible data-exchange features. Imported data may be appended as new records or inserted into the fields of existing records. Using your word processor's mail merge capabilities, you can easily combine exported address fields with notepad field text, then reformat them into daily correspondence.

Highly Recommended

Although it's powerful and useful, AEC Information Manager is not without weaknesses. Its reliance on 9-point Helvetica type in project-log fields can practically blind you with fine print when using a high-resolution, large-screen monitor. In addition, the program lacks autodialing capabilities, limits you to one work schedule calendar per file, and doesn't let you double-click on a word to select it.

But adding these features would simply refine an already solid, high-performance program. If you don't require the remarkable formatting capabilities of AEC Information Manager, then one of the less-expensive HyperCard personal time- and correspondence-management stacks may do. But if you need to manage large-scale projects or simply to organize a daily work load, you can't beat AEC Information Manager's ease of use, data import and export features, and superb report-formatting capabilities.—*Jim Salmons and Timlynn Babitsky*

See *Where to Buy* for contact information.



Power Fields

The powerful Submittal Log field in AEC enables you to keep track of time- and date-sensitive tasks. It automatically calculates how long it has been since each item was submitted.

Name It Again, Sam

Draw It Again, Sam 1.02

Object-oriented drawing program. **Pros:** Lets you create symbol libraries; has multiple layers. **Cons:** No dimensioning. **Company:** Aba Software. **Requires:** 512KE. **List price:** Version 1.1 \$150. **Copy protection:** None.

Beneath a silly name and a mediocre manual lies a good general-purpose, object-oriented drawing program in Aba Software's Draw It Again, Sam. Although Sam has several features found in CAD programs aimed at architects and engineers, it's closer to the MacDraw end of the CAD spectrum. For example, Sam surpasses MacDraw by offering multiple drawing layers and a library-creation capability, but it lacks the auto-dimensioning capabilities of a high-end CAD program.

Layers and Libraries

Perhaps more than anything, Sam's library feature sets it apart from MacDraw. While some CAD programs let you create libraries of drawing elements, Sam's is unique in that it automatically creates a small icon for each picture you add to a library. Each library's elements are visible in a scrollable window at the bottom of the screen—in Mac terms, it's like seeing miniature versions of the entire contents of the Scrapbook (see "Library Files"). To paste an element from the library into a drawing, simply click on its icon and place as many copies as you need on the screen. And

library objects can be accessed by name from a menu if you prefer.

Sam's multiple layers also distinguish it from MacDraw. You can assign objects to any of ten layers, which may be visible, invisible, or grayed. Registration marks can be applied to each layer, facilitating four-color printing. (Any combination of layers can be saved or printed separately.) Layers are handy for complex drawings in which numerous individual elements might be hard to select and manipulate, and for overlaying sections of a drawing (a building's plumbing, wiring, and furniture, for example).

Superior Tools

Sam allows you to draw lines or create fill patterns in eight colors. But through clever application of QuickDraw's drawing modes (opaque, clear, and invert), many more colors can be created. For example, if you place a 50 percent red pattern over a complementary 50 percent blue pattern, the result will be alternating red and blue pixels, which will appear purple. By overlapping colors in this way, you can display and print a wide range of hues.

Color mixing, layers, and libraries are Sam's most spectacular features, but tucked away in various menus are other valuable tools. For example, Sam's Objects menu looks almost identical to MacDraw's Arrange menu: group/ungroup, rotate, flip, send to back/bring to front, lock/unlock, and reshape polygon. Then, at the bottom of the menu, you see Reshape Freeform, an option that breaks a freeform shape into its component segments, allowing you to grab individual vertices and reshape the object. Sam's Zoom option is also superior to MacDraw's: you can zoom in on an area as well as zoom out to see the overall drawing. In

addition, Sam offers parallel lines, useful for indicating walls in architectural drawings. Finally, Sam's arc tool is an improvement on MacDraw's, allowing you to specify any portion of a circle's circumference, rather than MacDraw's quarter-circle restriction.

So, what does Sam lack? Most notably, Sam is missing MacDraw's Show Size command, which displays an object's dimensions as you draw it, as well as the dimensions of existing drawn objects. Nor does it provide a smoothing function like MacDraw's. Sam is also missing dotted lines and arrowheads, which are handy for technical drawings.

Viewed in the proper perspective, Draw It Again, Sam is a fine program. It offers enough features to tempt one to compare it to a more sophisticated CAD program such as MGStation or VersaCAD. But to do so would be unfair, because Sam is intended as a generic drawing program. According to an Aba spokesperson, Draw It Again, Sam is intended to be a "general-purpose drawing program as close to the high end as we can get while still keeping price and demands on the system low." In this Aba has succeeded: Sam sells for \$150 and runs on the 512KE.

Of course, the Mac software market changes so quickly that it's hard for any program to find a niche and fill it. For example, Claris's enhanced version of MacDraw scheduled for release in the second quarter of this year will offer layers and libraries, taking away some of Sam's edge over the original MacDraw. But Draw It Again, Sam is evolving as well, and may compete with a different type of program. Version 2.0 of Sam, which should be available by the time you read this, adds bit-mapped painting tools, making it a closer relative of SuperPaint or Canvas than of MacDraw.

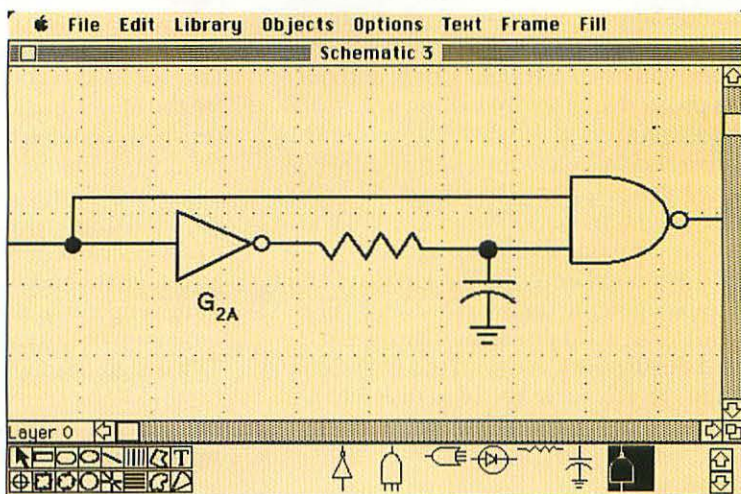
Rather than trying to peer into the future, however, I'll base my conclusion on the current market and the current version of Sam. I'd like to see a few features added, such as dimensioning, arrows, and object rotation by degrees, as well as a more professional manual, but if you're in the market for an inexpensive, basic drawing program, Draw It Again, Sam is a good bet.

—Erferit Nielson

See *Where to Buy* for contact information.

Library Files

Draw It Again, Sam lets you create your own libraries of commonly used drawing elements. The program automatically creates a bitmapped miniature of every object added to a library; you can edit the tiny icons if you wish.



A Hard Disk to Go

PhD

60MB SCSI hard disk with 20MB removable disk cartridge. **Pros:** Fast, reliable performance; rugged cartridges can be used for back-up or working storage; good documentation.

Cons: Slow start-up; disk partitions can't be selectively mounted and unmounted; loud.

Company: Century Data. **List price:** \$5495.

Requires: Mac Plus, SE, or II.



As hard disk capacities grow, more users are waking up in a cold sweat wondering how they're going to back them up. You need to hand-feed 50 floppy disks to back up a 40MB hard disk; 75 for a 60MB drive.

One solution is a tape drive, which can back up a hard disk in just minutes (see "Safety Net for Storage," *Macworld*, August 1987). Although great for data backup, a tape drive is useless as a second storage device or an extra drive. A more versatile solution is Century Data's PhD, a 60MB hard disk with 20MB removable disk cartridges. You can use the cartridges for back-up only, but they're also fast enough for day-to-day working storage.

Several large-capacity drives based on removable media are available, but the PhD is unique. Instead of using a flexible recording medium like those found in drives from Bering, Iomega, and Jasmine, Century Data based the PhD's removable cartridges on the same technology as hard disks. Each removable cartridge contains a single 8-inch metal platter, both sides of which are used for storage. The PhD's fixed disk uses three of the platters.

When you switch on the unit or change cartridges, the platter settles on its drive spindle and spins up to its 3522-rpm operating speed. The PhD's fan purges the air in the drive, replacing it with dust-free, filtered air. This routine, accompanied by a chorus of clunking and chunking sounds, takes almost two minutes.

The Drive that Roared

Once it's up to speed, the PhD performs swiftly—and loudly. The combination of a fan and two drives drowns out even an SE's fan. Fortunately, the drive comes with a 3-foot cable, so you can partially muffle the din by parking the unit under a desk. The PhD includes a setup utility that lets you format the fixed drive in different ways. You can use its 60MB as one

large disk or divide it into three 20MB volumes or a 20MB volume and a 40MB volume. Each volume has its own icon on the desktop. Unlike other hard disks that provide similar partitioning features, you can't selectively mount and unmount volumes as you work; all volumes appear on the desktop at all times, unless you start your Mac using the PhD floppy disk. Then you can mount just the volumes you want to work with.



FRED STIMSON

You can back up a 20MB volume simply by dragging its icon to the cartridge's icon. For larger volumes, you must use the Fast Copy utility, which prompts you to switch cartridges when necessary. Unfortunately, Fast Copy does not let you perform a selective backup. But the utility's speed helps make up for its inflexibility. Backing up a 20MB fixed-disk volume to the cartridge takes only 90 seconds.

All makers of removable mass storage media tell you to handle disk cartridges with care—good advice that's often ignored, especially by the postal system. To find out how a PhD cartridge would withstand shipping and general mistreatment, I kicked it, stood on it, and threw it to the floor, with the cartridge both in and out of its protective case. My sadistic urges satisfied, I reinserted the cartridge in the PhD drive and was pleasantly surprised when its contents appeared on the desktop, and downright impressed when the PhD utility's test routine found no errors.

For another test of the PhD's reliability, I unplugged the unit while saving a file. With some hard disks, this damages data and the drive. Not so with the PhD. Century Data cleverly turns the hard disk into an

electrical generator that provides just enough juice to safely abort the disk access, park the drive's heads, and remove power.

The entire PhD system performed flawlessly with a Mac SE and a II throughout a 90-day test period. On the Mac II, the drive also coexisted nicely with Apple's internal 40MB hard disk after I changed the PhD's SCSI address (using DIP switches conveniently located below the cartridge door).

I'd like to see a more flexible backup utility and I'd like to have a quieter fan, but overall, the PhD is an excellent performer. At approximately \$67 per megabyte, the PhD isn't cheap, but it's more versatile than a hard disk and tape backup combination, and it's built like a tank. If you're looking for a rugged, capacious hard disk that's a breeze to back up, the PhD may be just what the doctor ordered.—Jim Heid

See *Where to Buy* for contact information.

An EtherPort in the Storm

EtherPort SE

Ethernet communications board for the Mac SE. **Pros:** Good integration with VAX VMS and UNIX software; high network-carrying capacity.

Cons: Software for integration with IBM PC doesn't exist; hard drive and processor bottlenecks may limit speed increase to between 30 and 40 percent in lightly loaded networks.

Company: Kinetics. **List price:** \$795.

Requires: Mac SE; Ethernet cables.



With Apple's current emphasis on connectivity with DEC and IBM PC-based environments, it was only a matter of time before a full range of Ethernet add-on boards became available for the Mac. Kinetics, now a division of Excellan, has completed its suite of Ethernet products with the EtherPort SE board.

Kinetics' first product, FastPath, is an AppleTalk/Ethernet gateway that allows you to connect an entire AppleTalk network to Ethernet, the most popular network in the minicomputer and workstation world. One limitation of FastPath is that since AppleTalk is significantly slower than Ethernet (230.4 kilobits per second versus 2.5 megabits per second), if several members of a work group are doing large file transfers

between a Mac and an Ethernet-based machine, the whole AppleTalk network tends to bog down. AppleTalk networks are also poorly suited for integrating large work groups with minicomputers or workstations, due to the limitation of 32 active nodes per network.

Unlike FastPath, EtherPort SE links only a single Macintosh to Ethernet. This bypasses the AppleTalk bottleneck and results in higher performance and carrying capacity. Through use of the EtherPort SE, for example, you can network 50 to 100 Mac SEs to a DEC VAX—using the VAX for file service and print spooling in a transparent manner—without slowing down the network.

Etherizing Your Mac

EtherPort SE hardware consists of two boards: one that installs in the Mac SE slot and another that attaches to the back of the SE (purchasers should make sure they receive board model KFRE-1, the current version). An EtherPort SE Manager V1.0 installer program, plus NCSA Telnet V2.1e (EtherTalk) and NCSA Telnet V2.1a (AppleTalk) software are required for operation with products such as TOPS 2.0.

So as not to void the warranty, a Kinetics Certified Dealer should install the EtherPort SE hardware. Configuring the board simply requires flipping a switch to choose between thick and thin Ethernet connectors; there are no DIP switches or jumper pins to set. The Manager V1.0 program installs a driver called EtherTalk, which allows AppleTalk-compatible software to run over Ethernet cabling. As part of the installation process, it is also important to modify the boot blocks to increase the space devoted to the system heap. This is accomplished through a Kinetics program called Boot Edit.

The Network option allows the user to choose between the built-in AppleTalk network or the EtherPort SE with its EtherTalk driver. If you have all the correct hardware and software versions, software installation should take no more than five minutes.

Choosing the Network

Before committing to the EtherPort SE, be aware of some of the larger issues concerning Ethernet. While AppleTalk provides a complete set of networking protocols, Ethernet does not; Ethernet users

must decide how to fill in the remaining layers of the networking system to provide the services they want. This can be done through EtherTalk (an Ethernet-based implementation of AppleTalk), TCP/IP (a Department of Defense-based protocol now popular with universities and the scientific community), and other protocols such as DECNet.

In the EtherTalk camp are such packages as AppleShare and TOPS, both of which provide file-serving capability and are compatible with EtherTalk on the Macintosh. While both AppleShare and TOPS offer AppleTalk-based software and boards for IBM PCs, the equivalent EtherTalk software is unavailable, thus excluding IBM PCs from an EtherTalk-based solution.

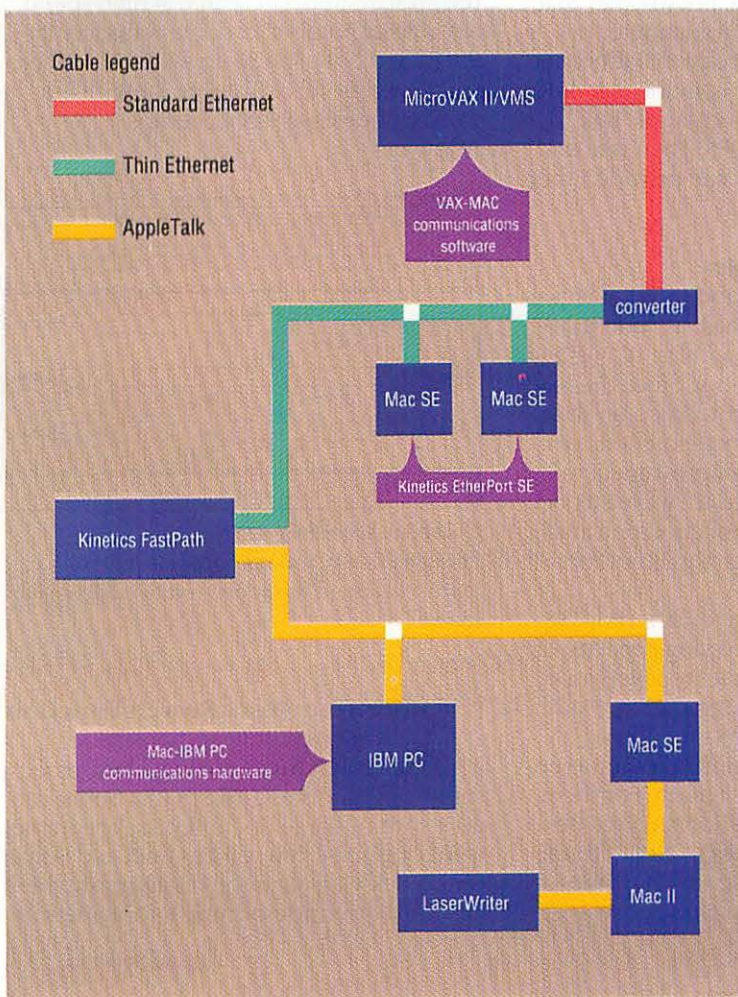
The situation for UNIX-based file servers is much better. TOPS/UNIX supports EtherTalk, as does PacerLink, which provides UNIX-based AppleShare. PacerLink also provides AppleShare support for VAX VMS machines as well.

In the TCP/IP camp are programs such as File Transfer Protocol (FTP), a very pop-

ular protocol used for file transfer among dissimilar machines. While many UNIX-based systems support TCP/IP and FTP, no full implementations are available on the Macintosh or IBM PC without running the A/UX or Xenix operating systems. For example, NCSA Telnet, the FTP implementation developed at the University of Illinois SuperComputer Center, does not support use of an IBM PC or Macintosh in host mode; in practice this means that a Mac or IBM PC cannot initiate a file transfer without the intervention of a UNIX-based system. Thus with only Macs and IBM PCs on the network, file transfer is impossible.

To remedy the current deficit in TCP/IP support, Apple expects to develop drivers for the Mac sometime in 1988, with Kinetics developing its own extensive TCP/IP software by midyear.

There may be hidden costs in going the Ethernet route. Since low-cost PostScript printers typically only provide an AppleTalk connection, if you want to use an AppleTalk-based printer such as the LaserWriter you must either connect it in RS-232



Activating EtherTalk

To activate the Ethernet connection, select the EtherTalk Link Access Protocol (ELAP) driver after clicking on the Network control panel icon. The Mac SE must also be rebooted.

mode (requiring the purchase of spooling software such as Kinetics' Kspool to allow Macs to print on it without switching settings), or purchase Kinetics' FastPath.

Performing under Ether

I tested the EtherPort SE in Mac-to-Mac communications using TOPS 2.0 in both the Ethernet and AppleTalk modes. I connected two Macintosh SEs—both included Apple 20MB internal hard drives—with the RAM cache switched off. Despite the fact that Ethernet is rated at over 40 times the speed of AppleTalk, my tests showed only a 30 to 40 percent decrease in transfer time when I selected Ethernet as the network medium instead of AppleTalk. As this does not take into account Ethernet's higher carrying capacity, the results would be likely to shift more in Ethernet's favor as the network becomes heavily loaded—a situation that might occur in a large work-group environment with extensive minicomputer file service.

These tests made it clear that the strength of the EtherPort SE is in networking large numbers of Mac SEs to minicomputers and workstations, not to other Mac SEs or IBM PCs. For microcomputer networks requiring only occasional Ethernet access, a less-expensive solution is to link the Macs and IBM PCs with AppleTalk, using AppleShare or TOPS. Then one or more FastPath gateways can provide Ethernet connectivity.

To Net or Not to Net?

Ethernet is not a good solution at present for networks that must include IBM PCs, since software support for TCP/IP and EtherTalk on the PC is poor. Since the Mac SE lacks the horsepower to keep up with Ethernet, users should not expect more than a 30 to 40 percent improvement in transfer speed compared to AppleTalk networks. So if IBM PC connection or transfer speed are your concerns, the EtherPort SE board is not for you.

The main advantage of EtherPort SE is increased network carrying capacity, or the ability to add machines to a network without performance degradation. Many companies must keep information on a central mainframe or minicomputer to enhance security or coordination. For them, using the EtherPort SE allows a large network of Mac SEs to access that mainframe or minicomputer as a file server, while maintaining an acceptable response.
—Bernard Aboba

See *Where to Buy* for contact information.

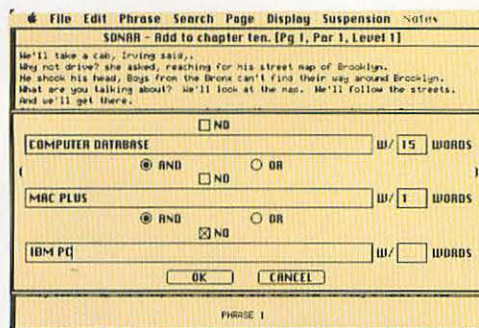
Getting Control of Your Data

Sonar 4.5

Text retrieval system. **Pros:** Very flexible and fast. **Cons:** Takes up a lot of disk space, depending on document size; manual needs improvement. **List price:** \$195. **Company:** Virginia Systems Software Services. **Requires:** 512K; 1MB memory. **Copy protection:** None.



Sonar can save you a tremendous amount of tedious work searching through large documents or multiple documents to prepare reports. This is software for the attorney who has to pore over thousands of pages of depositions to prepare briefs; for the executive who must scan correspondence, memos, and sales figures to create summary reports for the board; and for the researcher obliged to scrutinize hundreds of downloaded abstracts to compile bibliographies. This text-retrieval system will search at high speed any size or number of documents formatted in text only, MacWrite, WriteNow, Microsoft Word, More, or Trapeze, hunting for words, phrases, or relationships.



Complex Searches

This screen is an example of Sonar's Complex Phrase facility, which allows you to narrow your search.

More Than Just a Search Function

On the simplest level, Sonar does what the search function on a word processor or outliner does, except that Sonar can do it with multiple documents. Type in the word or phrase you want to find, and Sonar very quickly displays the paragraphs where the word or phrase occurs. It took me less

than five seconds to find all occurrences of a common word in an 800K document. Virginia Systems claims Sonar can read through 5000 pages a minute.

But besides its speed and ability to access multiple documents at once, Sonar has other advantages over a word processor's search function. For one, Sonar can search for as many words or phrases at a time as you like. And you can have it display an Occurrence Analysis that lists the document name and page numbers where it found each word or phrase.

Sonar also lets you carry out very sophisticated searches. Its Complex Phrase facility allows you to set up such instructions as: "Show me all paragraphs that contain *computer* and *database* within 15 words of each other and *Mac* and *Plus* immediately next to each other, but do not contain the words *IBM* or *PC*" (see "Complex Searches"). Sonar takes a lot longer to find these complex phrases, but that's the price you pay for all that power.

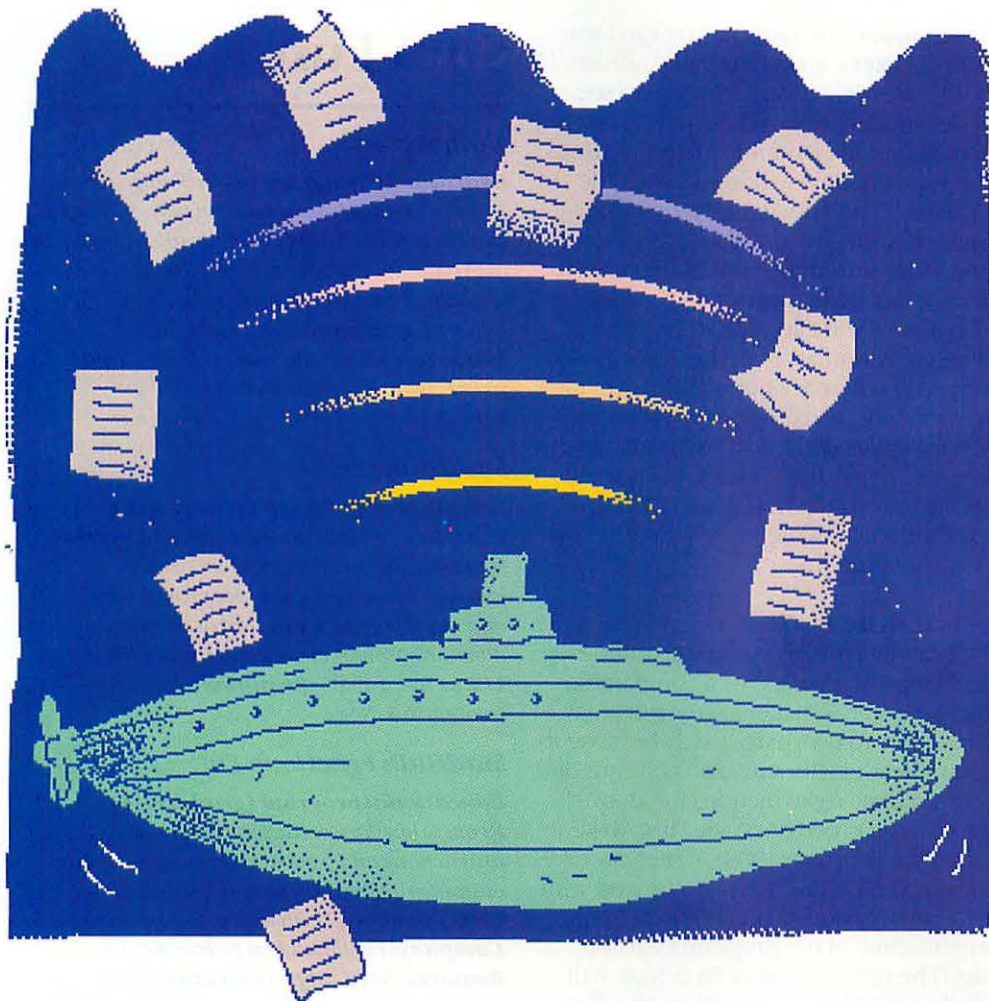
Sonar provides two ways for you to "take notes" as you search through documents. You can have words, sentences, and paragraphs accumulate in the Clipboard for pasting into a word processor later—a capability not found in most word processors, which erase any previous entry to the Clipboard when a new entry is added.

Another powerful note-taking feature is Sonar's Note File. You create notes by specifying pairs of subjects and the relationships between them. Then you can have Sonar tell you if there is an indirect relationship between any two subjects. Say you created the following four notes: "Bob Smith is the partner of Jeff Jones"; "Jeff Jones is the husband of Mary Jones"; "Mary Jones works for the Ajax Company"; "Ajax Company owns ABC Computer". If you later ask if there is a relationship between Bob Smith and ABC Computer, the program displays those notes.

Sonar has two modes for creating an index to your documents. It can create an index of unique words that appear in, say, only 5 percent of all paragraphs. That would eliminate common words that usually need not be indexed. Or you can create a text-only file in your word processor of the words you want to be indexed. In either case, Sonar creates an alphabetical list of the words that includes the page numbers where each word appears.

It's Not for Everyone

Sonar is primarily for people who must work with an immense amount of



text. If you only have to search a few documents, you'll probably find a word processor's search function more convenient than quitting from the word processor, going into Sonar, setting up the documents, and then returning to your word processor. And although Sonar, in a sense, turns text files into a database, it cannot replace a database-management system like Works or FileManager. Nor does Sonar provide the discipline imposed by database systems that require, for instance, names of cities to be in one field and names of people to be in another. So if you use Sonar to look for all your clients who live in Seymour, Connecticut, you may also come up with a letter from your cousin Seymour who lives in Hohokus, New Jersey.

One problem with Sonar is that, although it runs fast, its setup is slow and uses up a good deal of disk space. Before it accesses documents for the first time (and again each time the documents have been altered), Sonar creates a directory that contains information about the document files. And when used with some word proces-

sors, it also has to create a text-only version of the document. Setting up a 140-page, double-spaced Microsoft Word document (about 32,000 words) took almost seven minutes on a Mac Plus.

A larger problem is that the Sonar directory and the duplicate text-only files increase disk usage from about 40 percent to about 130 percent of the size of the original document (the larger the document, the smaller the percentage). This precludes, for all practical purposes, using Sonar on a floppy-based system. But a 70 or 80 percent increase of disk usage will strain many hard disk systems as well.

A final problem is the quality of the manual, which at times suffers from poor organization. Too often, examples are used in place of, rather than to illustrate, instructions.

Despite these problems, Sonar is a unique, powerful, full-featured, and relatively easy-to-use program. It's hard to picture the Mac being used in large corporate, legal, medical, or governmental libraries without it.—*Lawrence Stevens*

See *Where to Buy* for contact information.

The Way to Word

Microsoft Write 1.0

Word processor. **Pros:** Fast, easy selection of text; simple document formatting; online help.

Cons: Manual repagination; must use Page Preview to see columns, headers, and footers.

Company: Microsoft. **List price:** \$175.

Requires: 512K. **Copy protection:** None.



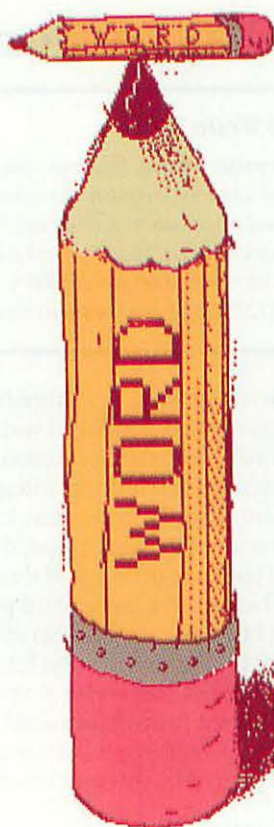
Microsoft Write is a simplified version of Microsoft Word without Word's style sheets, customized menus, glossaries, file linking, integrated outlining, automatic hyphenation, table-of-contents and index generation, mail merge, and page set-up. Most of these features don't belong in a basic word processor anyway, but a few would help even the casual user prepare reports and letters. In fact, Write does not even offer simple outlining, nor does it provide minimal control over default style settings—two features that should be in all word processors.

Some Simplifications

Overall, Write is an easy-to-use word processor that offers one of Word's principal strengths: fast and intuitive selection of text. To help the novice, Microsoft rewrote sections of the online help files and provided a more detailed index, as well as other elementary information such as how to join two paragraphs.

To simplify the complex formatting used in Word, Microsoft consolidated document formatting and font selection into fewer, more accessible menus. All style choices are displayed under Format and Font menus, with no submenus for character, paragraph, and section formats, or style definitions. Style and Shortcut key equivalents are the same as in Word. While this similarity may make it easier for someone to learn Word after learning Write, the extensive series of command key equivalents could overwhelm the novice. The format menu includes two useful options—one prevents a page break from occurring between two paragraphs, the other prevents a page break from occurring between lines in a paragraph. The document menu lets you create a title page—a cumbersome series of steps in Word.

Headers and footers are similar to Word's—you can insert multiple lines and place them horizontally with the ruler or



vertically in the Page Preview mode. You cannot, however, designate odd and even pages. The program also includes an 80,000-word spelling checker. It's fast, and it suggests sensible alternatives when it finds words it assumes are spelled incorrectly. Microsoft modeled Write's window-management capabilities on Word's. The split screen, horizontal scroll bar, and Window menu make it easy to copy, cut, and paste information in the same document or between documents. Unfortunately, Microsoft did not change two of Word's annoying shortcomings—the lack of dynamic re-

pagination, and the fact that you can't see headers, footers, and columns on screen. You still must select Page Preview to see these elements displayed. Novices, however, will find the dynamic margin settings in the Page Preview window easy to use.

Write offers tabular and newspaper column formats, but not side-by-side columns. Microsoft implemented the column selection and table functions from Word, which means you can select, copy, move, and delete columns, as well as total the values in each column. The ruler bar includes a marker to draw hairlines between columns for tables and forms. Write also includes mathematical typesetting, a seemingly advanced function that Microsoft hopes will make Write more useful to educational institutions.

Is It Write for You?

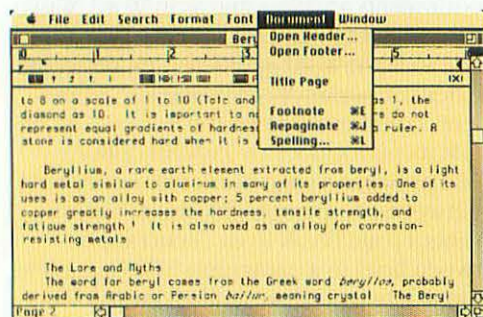
Write offers many more capabilities than Claris's MacWrite. For a comparable price, however, T/Maker's WriteNow may prove easier to use, particularly because it displays headers, footers, and columns and offers dynamic repagination (for an overview of word processors, see "Just Write," *Macworld*, February 1988). WriteNow takes up less room on disk (79K, compared with 287K), and version 2.0 currently in beta corrects some of the program's earlier faults. The new version of WriteNow will include a 100,000-word spelling checker, internal import/export file formats (the Translator will be linked into the program), window menus, and mail merge.

As a stand-alone word processor, Write does not offer some features even a novice might want. But it does give you easy control over page set-up and window management, and it offers the best text selection tools of any word processor. Write's extensive import/export file formats may help in offices where MacWrite and Word documents are routinely exchanged between the Mac and the PC. But most word processors already include these file formats.

It may not make sense to buy Write if you intend to upgrade to Word, or if you need Word's more powerful features. Ask your dealer for a demo of Word's short menus (which hide some features), and compare Word to Write. While the idea of a basic word processor may sound appealing, it's only good if it solves your needs.

—Janet McCandless

See *Where to Buy* for contact information.



Formatting Made Easier

Document format choices are displayed in Format, Font, and Document menus. Write does not include many of Word's advanced options.

Sum Fun

Math Wizard

Educational program (ages 5–10). **Pros:** Suitable for young kids; two can play; skill levels can be adjusted. **Cons:** No tutorials or guidance with math concepts; games and animation are unsophisticated and repetitive; keyboard input required. **Company:** Unicorn Software. **List price:** \$49.95. **Requires:** 128K. **Copy protection:** Key disk; doesn't install on hard disk.

MathTalk 1.0

Educational program (grades K–8). **Pros:** Instructions, tutorials, and feedback are spoken aloud; custom problem sets can be entered and solved; guidance provided for difficult problems. **Cons:** Not as gamelike as other programs reviewed. **Company:** First Byte. **List price:** \$49.95. **Requires:** 512K. **Copy protection:** None.

MathTalk Fractions 1.0

Educational program (grades K–8). **Pros:** Games are consistently entertaining; instructions and feedback are spoken aloud; custom problems can be entered and solved. **Cons:** No tutorial help with underlying concepts. **Company:** First Byte. **List price:** \$49.95. **Requires:** 512K. **Copy protection:** None.



Well-designed educational software can make learning basic math seem more like a fun game than a drill. For this review I looked at three Macintosh programs. I had some help from a distinguished panel of software evaluators: nine-year-old Ben, six-year-old Josie, and a random collection of their friends.

Math Wizard

Math Wizard captured the kids' attention first with its menu full of exciting-sounding games. Each of the four games described below uses simple animation to make basic arithmetic keyboard drills interesting. Wizard's Flash is a flash-card drill in which an on-screen Wizard nods approvingly each time the child enters the correct answer to a problem. The type of problem (addition, subtraction, multiplication, division, or mixed) and the level of difficulty (from one-digit sums to complex problems requiring the use of pencil, paper, or calculator) can be adjusted at the beginning of each session.

In Dragon Race, a pair of dragons dash toward the finish, each one moving forward with each correct answer by its young handler, adding a competitive edge for children working in pairs. Elf's Equations is a multiple-choice drill in which students type the missing term in a simple equation ($4 + ? = 11$). And the Troll's Toy Shop is filled with multiple-choice word problems.

My program testers enjoyed playing all four games for several practice sessions, but their interest waned when the word problems started repeating (with different numbers)—the easy problems began to seem too easy, and the program provided no tutorial help with the harder ones.

MathTalk

Like Math Wizard, MathTalk includes drill-and-practice games for mastering basic arithmetic tables. MathTalk's TableTalk section challenges the learner to fill in the cells of an arithmetic table in a random order, with or without a time limit. The Mystery Number section displays simple equations with missing elements that the student fills in. There are no racing dragons or dancing elves in these games, but a talking Professor Matt A. Matics (using the built-in SmoothTalker speech synthesizer) provides spoken rewards aplenty. The professor also offers guidance with customizable math books in other modules of the program. The math book feature is the major strength of MathTalk. The program disk comes with four files, called books, that contain the simplest problems for each math operator. But students, parents, or teachers can easily use the program's templates to add books containing more complicated problems.

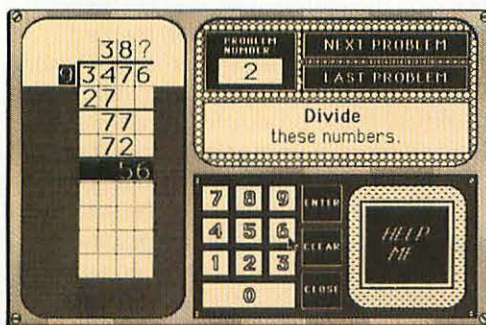
Once such files have been created, kids can solve the problems on the computer, receiving step-by-step guidance when necessary. Unlike Math Wizard, MathTalk breaks large multiplication and division problems into steps that can be conquered by younger kids (see "Divide and Conquer"). When the learner makes mistakes, the professor offers to work the problem on-screen before letting the child try again. There's even a Talking Calculator for getting instant answers to particularly tough problems.

MathTalk didn't jump out and grab my panel of testers, but it kept them interested—and learning—long after Math Wizard had grown old.

MathTalk Fractions

The robot-voiced professor returns in MathTalk Fractions. Like MathTalk, this program allows students to enter their own problems, from homework or imagination, for the professor to check. MathTalk Fractions also provides a wide variety of imaginative games that take the drudgery out of drills with fractions, decimals, and percentages. These range from the clever carnival games in the Fun House to the TV-style Team Challenge, in which the learner sets the difficulty of the game by choosing from a field of six cartoon opponents with different mathematical skill levels.

While MathTalk Fractions is clearly a better entertainer than MathTalk, it's a weaker tutor. Simple hints replace the "first do this step" tutorials here, and the professor doesn't hold office hours in MathTalk Fractions. A learner who doesn't know or remember how to add together two fractions with different denominators, for example, will have to ask a human to explain the underlying principles. Still, the program provides a wonderful playground where kids can practice fractions.



Divide and Conquer

MathTalk leads the learner step-by-step through complicated long-division problems like this one.

Summing Up

Each of these programs has something special to offer: Math Wizard games are fun for the youngest arithmetickers; MathTalk provides better tutorials and more thorough lessons; and MathTalk Fractions—most appropriate for grades K through 6—is a highly entertaining medium for practicing fractions, decimals, and percentages. MathTalk is probably the best of the three as a stand-alone educational program, but any of these programs would work well as a supplementary practice tool in the classroom or the home.

—George Beekman

Apple's Junior Business Printer

ImageWriter LQ

Twenty-seven-pin, wide-carriage dot matrix printer for the Mac. **Pros:** Excellent print quality; high-speed printing; flexible paper-handling options. **Cons:** Occasional paper-feeding glitches, with resulting imperfections in output quality; extremely noisy. **Company:** Apple Computer. **List price:** \$399. **Requires:** 512KE.



With the new ImageWriter LQ, Apple has finally staked a claim in the high-resolution dot matrix printer market. Equipped with a 27-pin print head for razor-sharp type, a wide carriage for oversize spreadsheet printouts, enough paper-handling options for any office, and respectable speed, it's a formidable contender.

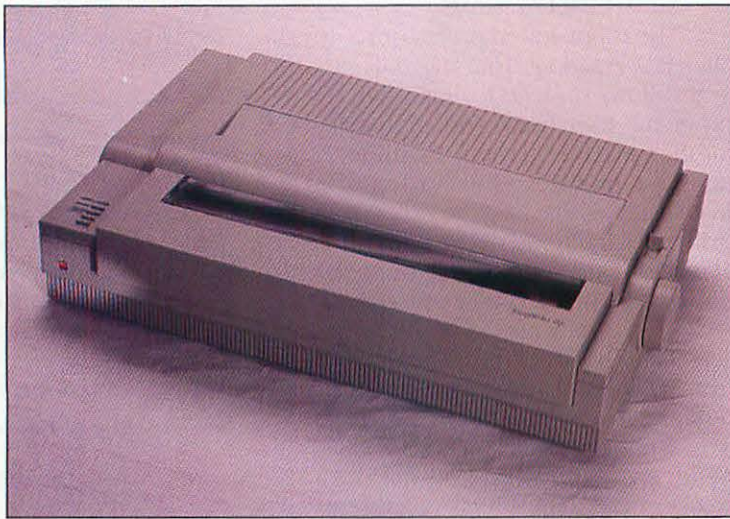
The LQ connects to the Mac through a standard ImageWriter cable, or via AppleTalk, if you install an optional board for that purpose in the printer (other options include color ribbons and a cut-sheet feeder). Before you can print, you must add the LQ's driver and a set of fonts to your system disk(s). For every type size you plan to print, the driver requires a second font description that's three times that large to achieve the LQ's potential quality. Typefaces supplied with the printer include Times Roman, Helvetica, Courier, and Symbol, each with the dual descriptions needed to print at 9, 10, 12, 14, 18, and 24 points.

With two files for every printable font, the LQ makes a big demand on disk space—especially since the bigger font sizes take up much more room in the system file. Installing only the six Times Roman sizes, for instance, costs you 209,742 bytes. Floppy disk systems obviously won't be able to accommodate all of the LQ fonts at once, and even hard disk users may be reluctant to install the entire set.

Although the LQ offers a range of paper-handling options, some function imperfectly. The unit accepts pin-feed paper through slots in both the rear and the bottom (for slotted printer stands). When set for bottom feeding, however, the tractor mechanism runs only in the forward direc-

See *Where to Buy* for contact information.

The ImageWriter LQ is a serviceable machine that should help Apple establish its reputation as a business-oriented computer company.



FRED STIMSON

tion, so it won't work with graphics software that moves the paper up and down. A more serious problem with pin-feed paper is the printer's tendency to occasionally misfeed and crumple the paper, particularly when the tractor is operating in reverse. The LQ does better at single-sheet feeding, which can be done manually or with an optional cut-sheet feeder.

Quality and Performance

The LQ turns in solid, if less than ideal, performance in terms of print quality and speed. On the graphics side, the LQ theoretically offers 320-by-216-dots-per-inch (dpi) resolution, but until software programs are updated, graphics from the LQ will look no sharper than they would from a standard 72-dpi ImageWriter. In the text department, the LQ's six built-in fonts include three perfectly readable draft fonts and an outstanding letter-quality Times-like proportionally spaced font. However, you can access only one of the draft fonts

with the Macintosh driver. (There is a button for choosing among the built-in fonts, but it is only activated when used with an Apple IIGS.) When you select Best or Faster modes the Macintosh driver automatically downloads character bitmaps from the Mac.

In Best mode, with the necessary triple-sized versions of a document's fonts in place on the system disk, you get beautifully sharp output that you'd be hard pressed to distinguish from that of a LaserWriter. The characters are of far superior quality to those produced by earlier ImageWriters. Without the proper font files, or if you choose Faster mode, the driver downloads bitmaps of the screen fonts, with rather unattractive results.

In Draft mode, the LQ speeds through text; rated output is 250 characters per second, and I printed an average page of text (about 500 words in one font) in 40 seconds. That's competitive with the real-life performance of the LaserWriter, despite the

latter machine's 8-page-per-minute rating. The LQ's Best mode slows things considerably, however; it took 3 minutes, 40 seconds to print the same page. Best mode grinds to a snail's pace if you change fonts in your document.

Often enough to be irksome, slight paper-feed sputters result in small but noticeable imperfections in text characters. Lines of characters sometimes appear slightly wavy, giving them an almost italic look; sometimes they are too short or too tall. Such glitches are much less frequent when the head is set to print unidirectionally.

Be forewarned that the LQ is one noisy machine. In Best mode, or when printing dense graphics, it emits a grinding, buzzsaw screech, and even its draft modes are louder than those of similar dot matrix printers.

Laser, LQ, or Other?

For some businesses, the speed of its Draft mode and the high quality of its text output make the ImageWriter LQ a workable alternative to a Laser printer. Of course, laser printers are faster and quieter, and with PostScript they're unbeatable for printing page layouts. But a LaserWriter can't print on wide paper, and since it's not an impact printer, it can't print multicopy forms. Laser printers are much bulkier than the LQ. And even the cheapest PostScript machine initially costs at least \$2000 more than the LQ and costs more to supply and maintain.

There are several other excellent 24-pin wide-carriage printers that list for about \$200 less than the LQ, and most of them make less noise. Although you can't use Apple's downloadable fonts with those machines, you get attractive text with their built-in letter-quality fonts, and you save room in the System file as well.

On the other hand, choosing the LQ means freedom from worries about compatibility and connectivity. And although the newest ImageWriter has a few flaws, it's a sensible choice if your budget is too small for a LaserWriter, or if you need the special capabilities that only a dot matrix machine can give.—*Steve Cummings*

See *Where to Buy* for contact information.

This line is printed in 10 point Courier in Best mode

This line is printed in 10 point Courier in Best mode, without a 3X font image

This line is printed in 10 point Courier in Faster mode

This is a sample of the ImageWriter LQ's draft font

ImageWriter LQ Output

These are examples of the ImageWriter LQ's output in Best mode, Best mode generated from bitmaps of the screen fonts, Faster mode, and Draft mode.

maintained in the batch-checking mode. For instance, I found a situation in which a word was respelled beginning with a lowercase letter, when the original had been capitalized.

One of my favorite features in Spelling Coach is the dictionary window, which shows all the words in the dictionary. The base list cannot be edited, and appears in plain text. User-added words appear in italics, and you can edit them. Words containing any ASCII characters (such as diacritical marks or even mathematical formulas) can be added to the dictionary.

Another nice feature is the analysis window, which gives a brief list of statistics for any document checked in the batch mode. The analysis window also lists suspect words, which you can sort to find and remove duplicates. The user can choose any portion of the remaining list to add to the dictionary, or choose the actual misspellings individually, to see them in context and correct them (see "Windows of Words").

The program offers many other handy features, including the ability to directly edit text from within the Coach Speller. This is useful for situations the spelling checker can't correct, such as removing a space accidentally typed within a word. Spelling Coach also offers some simple error-checking facilities, such as checking for capital letters at the beginning of sentences and finding double double words.

The user-definable configuration options are very complete. For instance, the user can assign command keys to the 12 menu choices. The manual is clear and concise, and contains illustrations, instruc-

tions, and tips. Deneba also offers an 800 number for technical support.

Spelling Coach is one of the very best spelling checkers. Even if your word processor has a built-in spelling checker, you may still want Spelling Coach or Spelling Coach Pro for the thesaurus, definitions dictionary, statistics, and simple grammar-checking features. While Spelling Coach is not without its rough edges, its flexibility and large dictionaries make it a true power-user's product. —*Scott Beamer*

See *Where to Buy* for contact information.

Musical Musings

Jam Session 1.0

Interactive music performance software.

Pros: Lets almost anyone sound like an accomplished, if repetitive, musician. Comes with high-quality (for the Mac) digitized sounds and a set of engaging songs covering many musical styles.

Cons: People who lack a well-developed rhythmic sense may have trouble getting good results.

Company: Brøderbund Software. **List price:** Version 1.1 \$49.95. **Requires:** 512K, one 800K disk drive; two 800K drives or hard disk, and external speakers or headphones recommended.

Copy protection: Key disk; installs on hard disk.

M 0.94

Interactive MIDI composition tool. Pros:

Provides a comprehensive set of powerful controls for altering nearly every element of a performance. **Cons:** People accustomed to conventional-sounding music may find M's experiments unacceptably cacophonous.

Company: Intelligent Computer Music Systems.

List price: \$150. **Requires:** 512K Mac or Mac Plus, MIDI interface, MIDI synthesizer. **Copy protection:** Key disk; installs on hard disk.

puter. However, they do so in very different ways.

Music for the Masses

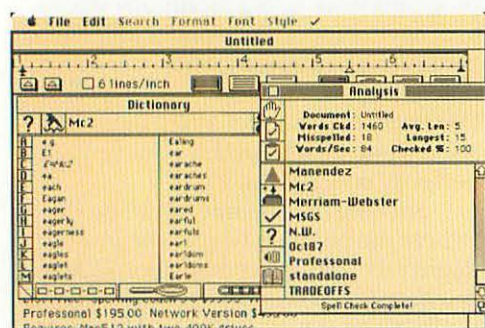
Brøderbund's Jam Session is a blast, whether you're tone deaf or an accomplished musician. A backup band plays a prerecorded accompaniment, and you play a solo by pressing keys on the Mac keyboard. The 19 songs supplied with the program cover jazz, classical, rock, country, Latin, reggae, rap, and more. And these aren't just repeating patterns, they're fully realized compositions with reasonably interesting chord changes and arrangements. As the music plays, animated musicians perform on screen in an appropriate environment.

The screens are cute, but more important, Jam Session sounds good. All the sounds are digital samples recorded from actual instruments, and even the piano and the heavy-metal power chords sound a lot like the real thing. Of course, the Mac isn't renowned for high-quality audio—while a stereo hookup does wonders for the sound, you still hear a lot of digital noise and distortion (Jam Session does not support MIDI).

Being able to step out as the soloist makes Jam Session really fun. Each alphanumeric key plays a single note or a riff, a short passage, on a particular instrument, and produces an enthusiastic wiggle from the corresponding member of the screen band. Notes are assigned to keys in advance, so that whatever key you press, you'll always (well, almost always) be in harmony with the backup band.

Despite the fact that all the riffs are prerecorded, soloing with Jam Session sounds remarkably lifelike and unmechanical. For starters, most riffs have enough complexity and stylistic authenticity to sound like real music (the Carlos Santana imitations on the Latin rock tune, for example). And there are enough riffs to build a varied performance. The Mac keyboard is usually divided between two or more instruments, each with its own riffs. Many keys are assigned several alternative riffs, with Jam Session automatically playing the one that fits the harmony at that point in the song. Pressing the Shift key accesses another complete set of riffs.

Most often, the solo instruments are guitar, keyboards, and drums; but depending on the song you might play country fiddle, classical flute, or Jamaican steel drums. There are also sound effects to fool with: power zaps on the heavy-metal songs,



Windows of Words

The dictionary window displays the words included with the program in plain type; user-added words appear in italics. The analysis window displays document statistics as well as a list of misspelled words. The list can be alphabetized, and duplicate words can be removed. Remaining words can be added to the dictionary or corrected.



So you wanted to be a rock 'n' roll star, but somehow you got stuck behind a desk pushing papers. A pair of Mac programs—Jam Session and M—may not change all that, but they stand ready to help liberate your personal muse. Like other interactive performance entries (see "Getting Started with Music," *Macworld*, November 1987), both programs let you blend your own music with input from the com-



clucking chickens on the country tunes, even a digitized voice for rapping. You can change the instrument assigned to a riff, or edit the riff's notes.

Even though you can't play any really wrong notes (unless you add them by editing a riff), it still takes a bit of concentration to create a truly satisfying performance with Jam Session. Some sequences of riffs sound a lot better than others, and you have to experiment to find which combinations work best. Also, you need a decent sense of rhythm to get the most from the program. Normally, Jam Session starts a riff as soon as you press the key, whether or not you come in on the beat. There's a menu command that forces riffs to start at the beginning of a measure, but since most of the riffs last only one or two beats, you'll hear unmusical pauses if you use it.

Dial M for Music

Where Jam Session lets you create conventional-sounding music even if you can't play a note, Intelligent Computer Music Systems' M goes out of its way to help musicians bend and break the rules. It's a musical house of mirrors that's not for the timid, but it can still be great fun.

The basics are simple. Using a MIDI keyboard or a screen keyboard graphic, you specify a series of notes (and rhythms, if you like) for the program to work with. M takes that raw material and generates a performance, but the performance is likely to sound very different from your original notes. The reason? The program can randomly vary a host of important musical elements during the performance, including the fundamentals of note order and rhythm. You have control over how ran-

dom M gets, but you can also take direct control of the variations yourself.

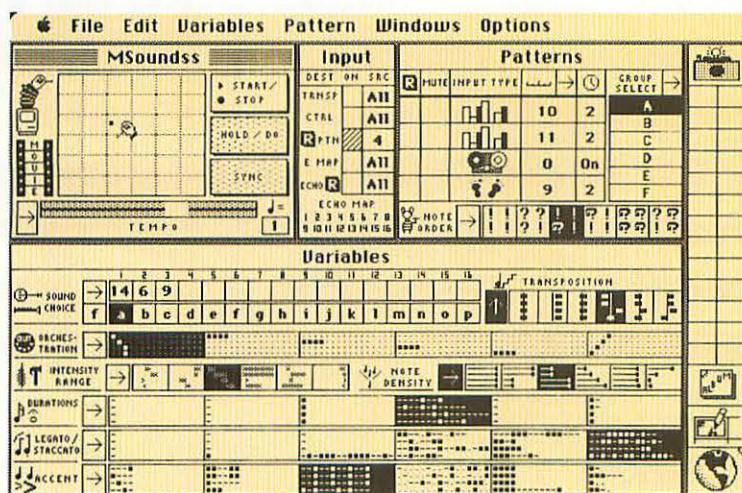
This fundamental idea quickly becomes extremely complex, because there are so many elements to vary, and M lets you change any combination of them as you are playing your music. The complications start with the notes themselves. Four separate voices (note patterns) can play at a time, but you can record six different songs, each with four patterns. For each pattern three rules govern the order in which notes play (in the same order in which they were recorded, in a completely random order, or in an initially random but then repeating order), and you can choose one method for all four voices or mix the rules in any combination.

Among the other musical variables subject to control or randomization are the volume range (MIDI velocity), the duration of each note, the tempo of each pattern, and the tempo of the overall performance. Besides controlling any of these variables individually during playback, you can also "conduct" any combination en masse by moving the mouse across a screen grid.

As you might guess, this double-barreled randomness can easily lead to cacophony. But if you choose your starting notes judiciously, M can take you down some delightful musical corridors you might never have otherwise discovered.

M supports the MIDI file standard, so it can share performance files with standard sequencing software such as Passport Design's Master Tracks Pro and Opcode System's Sequencer 2.5. M's liberating unruliness makes it an excellent complement to such conventional MIDI software staples. —Steve Cummings

See *Where to Buy* for contact information.



Music Control

M's main screen is very busy, but the multitude of controls make sense after a little work with the program. The grid with the band holding the baton in the upper left-hand corner is the conductor; a mouse cursor that lets you vary many aspects of a musical performance while the composition is playing.

They Can't Hurt

This review looks at surge suppressors. The accompanying table compares features and gives companies and prices.

You see ads for surge suppression equipment, liberally sprinkled with lightning bolts and paranoia-inspiring admonitions to "protect your valuable investment," scattered throughout computer publications. Before discussing what these surge suppressors can do for a Macintosh user, let's pinpoint what they *can't* do.

Surge suppressors can't protect against brownouts, power failures (no matter how brief), or voltage drops caused by faulty or inadequate wiring (the sort of condition that causes your lights to dim when the air conditioner turns on). They also won't compensate for the frequency drift you might get if your power source is a portable generator. To counteract these conditions you need a bulkier and much more expensive piece of equipment—an uninterruptible power supply.

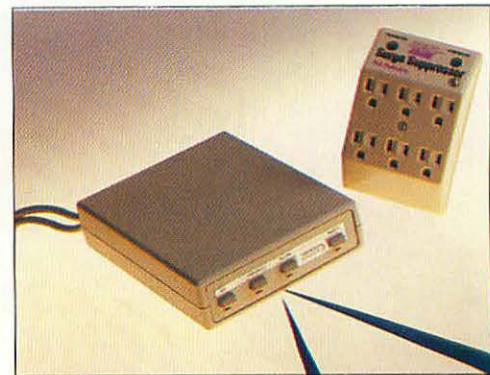
However, surge suppressors do protect against some less-visible power problems. Most filter out electromagnetic noise, which can be caused by nearby radio transmitters, cheap light dimmers, poorly filtered computer equipment, or worn electric motors; they can protect against transient voltage spikes caused by nearby

or distant lightning striking power lines; and they can absorb the voltage surges that result from switching on large motors or from problems with your electric company's power grid.

Since surge suppressors cost about as much as a new game or utility software, and since the Macintosh itself is largely immune to the conditions that surge suppressors protect against, you might well question the need for one. Still, as you acquire new peripherals you have a need for more outlets and some form of central power control, and surge suppression usually costs only a few dollars more than the equivalent bare outlet box. Furthermore, your peripherals might not have the same immunity to surge conditions that the Macintosh has. There are situations, though they're rare, when power problems are a very real concern and surge suppressors can prevent loss of data or even hardware damage. Like eating chicken soup for a cold, surge suppressors are inexpensive, might contribute to your peace of mind, and can't possibly hurt.

Which One for You?

Your choice of a suppressor will probably be dictated by factors other than performance, such as number and location of outlets and switches, cord length, power-on indicators, and styling. The 11 units I evaluated ranged from the Maccessories Surge Suppressor, which simply replaces the Macintosh power cord, to the Electra Guard 20, which provides six electrical outlets. The units also varied from under-the-



desk designs (the familiar power strip) to those, like the Relax Technology units, that are styled for desktop use. The Relax models are flat (1½ inches high) and fit under a one-piece Macintosh or under the monitor of a Mac II. Besides the Maccessories Surge Suppressor, Kensington also offers a desktop model, the Maccessories Control Center, and the System Saver Mac, a combination power center and fan that fits in the handle of the Macintosh 512K and the Plus. (All units have three-prong plugs and sockets; proper grounding is imperative in a surge suppressor.)

If you know you have power problems, or if you have critical data or other reasons for being unusually concerned about spikes and surges, you should look into Sutton Designs' ZX-5000/4. A pricey and very rugged basic suppressor, the ZX-5000/4 has some impressive specifications. The manufacturer includes a detailed description of its test setup and results with the unit.

Surge Suppressors Compared

Device	Manufacturer	Outlets	Switched Outlets	Lights ¹	Max. Load (in watts)	List Price	Notes
Electra Guard 3+	CPS	1	0	S	1875	\$17.95	Single adapter-style plug
Electra Guard 5	CPS	6	0	P, S	1875	\$39.95	Indicator detects improper grounding; uses both plugs of standard duplex outlet
Electra Guard 20	CPS	6	0 ²	S	1875	\$119.95	
Maccessories Surge Suppressor	Kensington	1	0	0	525	\$49.95	Replaces power cord
Maccessories Control Center	Kensington	4	3 ²	3, P	960	\$99.95	Replaces power cord; for desktop use
System Saver Mac	Kensington	3	1 ²	P	1080	\$99.95	Replaces power cord; fits in handle; fan
Power Control 2	Relax	4	3 ²	P	1200	\$69.95	For desktop use
Mini Power Control	Relax	5	4 ²	4, P	1200	\$79.95	Fits under 512K, Plus, SE
Power Control 3	Relax	4	3 ²	3, P	1200	\$89.95	For desktop use
Power Control 4	Relax	6	5 ²	5, P	1200	\$99.95	For desktop use
ZX-5000/4	Sutton Designs	4	0 ²	P, S	1875	\$119.00	

¹ Number of sockets with indicator lights; P means unit has master power-on light, S means unit has indicator that shows whether suppression circuitry is in working order (an important consideration, since the active devices in most suppressors have a limited lifespan).

² Has a master switch that controls all outlets at once.

The tests I performed were informal, designed to check only basic responses to electromagnetic noise, transient spikes, and voltage surges. I made no attempt to verify manufacturers' claimed ratings or to find the point at which the suppressor (or the Macintosh) would be damaged. The units passed these simple tests.

Under ordinary conditions, you're unlikely to need a surge suppressor. The Mac handles everyday power problems with ease, and during such extreme conditions as nearby electrical storms I would unplug my equipment whether or not I had a suppressor. If local conditions did compel me to get a surge suppressor, I wouldn't settle for anything less than the Sutton. On the other hand, owning even the simplest Macintosh configuration usually leads to a shortage of electrical outlets. If this is the case, then you might as well spend a bit more and get a surge suppressor with several outlets instead of a basic outlet box. Besides, you'll appreciate being able to turn on your equipment without groping around the back of the Mac and its peripherals or crawling around under your desk. —Ron Risley

See *Where to Buy* for contact information.

The Best of Both Worlds

Mac286

MS-DOS coprocessor. **Pros:** Runs all MS-DOS software; easy to install; many options for disk setup; supports the LaserWriter for MS-DOS applications; optional 80287 math coprocessor chip.

Cons: Expensive; requires additional purchase of 5¼-inch drive; uses 640K of RAM; screen refresh and mouse software are very slow.

Company: AST Research. **List price:** \$1499.

Requires: Mac II; 5¼-inch external floppy drive.

AST's Mac286 coprocessor board lets you run popular MS-DOS programs like 1-2-3 and dBase III on a Mac II. It's supplied with everything you need except an Apple (or Dayna Communications) 5¼-inch external drive or an IBM 3½-inch drive. The drive plugs into a connector on the Mac286 and works like an MS-DOS drive A: or drive B:. A partition in the Mac's hard disk becomes the MS-DOS drive C: and behaves just like a hard disk in an IBM PC AT. The rest of the hard disk, or a

Mac 3½-inch drive, or networked volumes mounted via AppleShare or TOPS, can be used as drive D: for storing DOS applications and data files. These disk facilities provide a great deal of flexibility for sharing data between DOS and Mac applications.

Installation takes only about half an hour, thanks to detailed step-by-step instructions. The Mac286 hardware consists of two interconnected boards that slip into the Mac II's NuBus slots. You install the software from the Finder, and then define the size and location of the hard disk partition that will hold MS-DOS and your applications (I chose to use 10 megabytes out of my 40MB). After installation, you launch the Mac286 icon, and within seconds you see MS-DOS prompts on the Mac screen. Then you can install MS-DOS applications.

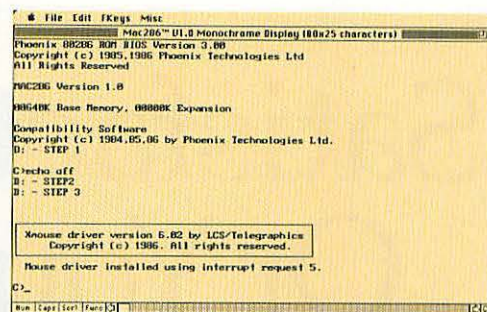
Although the Mac286 has 1MB of RAM for DOS and applications to reside in, it uses an additional 640K of the Mac's RAM. Since my Mac II has 8MB, the memory requirements were not a problem. But if your Mac has only 2MB, you may want to add more memory. For instance, when I ran MultiFinder, MS-DOS, 1-2-3, Excel, and Word, my system grew to 1400K.

The Mac286 has a built-in capability for supporting the LaserWriter, so MS-DOS programs that use PostScript can produce high-quality output. For non-PostScript applications an Epson FX-80 emulator is provided, allowing printing on either the LaserWriter or ImageWriter. In MS-DOS mode, the LPT1 printer port gives you access to the Mac's Chooser and to the selected printer. Additionally, the Mac's serial ports (printer port and modem port) function interchangeably as COM1 or COM2 for other devices, such as modems. You configure the port addresses via a Mac menu.

The Mouse That Crawled

When you're running DOS, the Mac's mouse has full access to the Mac286 menu bar, the Apple menu, the Control Panel, and all desk accessories. When you're working in a DOS application that supports the Microsoft Mouse, AST provides an MS-DOS Mouse Mode that you can turn on and off from the menu bar. Unfortunately, in this mode the mouse is too slow to be usable.

The Mac286 emulates only IBM's Monochrome Display Adapter (MDA) or Color Graphics Adapter (CGA), or the Hercules Graphics Card. Since none of these emulations offer the resolution or color choice available on the Mac II, you can't get



Starting Up DOS

To access the MS-DOS prompt while using the Mac286 coprocessor, simply launch the Mac286 icon and wait for the memory check and mouse driver installation. You can then issue standard DOS commands or run DOS applications.

Mac screen quality from the Mac286. To make matters worse, screen refresh is so slow that you see a ripple when scrolling. In CGA emulation mode, refresh becomes even slower—almost painfully so.

How fast is the Mac286? Its 80286 chip runs at 8 MHz, which should be equivalent to the speed of an IBM PC AT. You can add an 80287 math coprocessor chip to speed up certain mathematical operations. But, how does it work when you use an application?

In my timing tests (which used a 1-2-3 spreadsheet), I found that the IBM PC AT's screen-refresh rate was about 3.8 percent faster than that of a Mac II with the Mac286 board. Both computers were running in CGA mode. This test confirms comments from AT users that the AT is a little faster than the Mac286 in screen-refresh-intensive operations such as recalculating a spreadsheet or redrawing a page layout.

Who's It For?

Including the 5¼-inch drive, the Mac286 coprocessor package costs about as much as a fully equipped AT clone. Is it worth it? If you have enough desk space for two computers and don't mind using two machines, then you should probably buy an inexpensive AT clone. However, if you have limited desk space but still need to switch back and forth quickly between the Mac and IBM worlds, then the Mac286 is an appropriate solution. The Mac286 will also satisfy those who want to use the Macintosh for certain applications, but at the same time must work in a corporation that has invested in DOS software.

—David Peltz

See *Where to Buy* for contact information.

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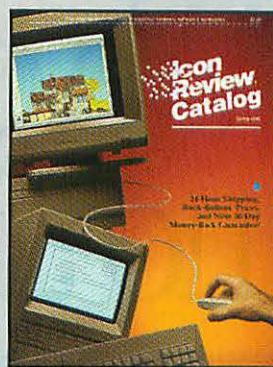
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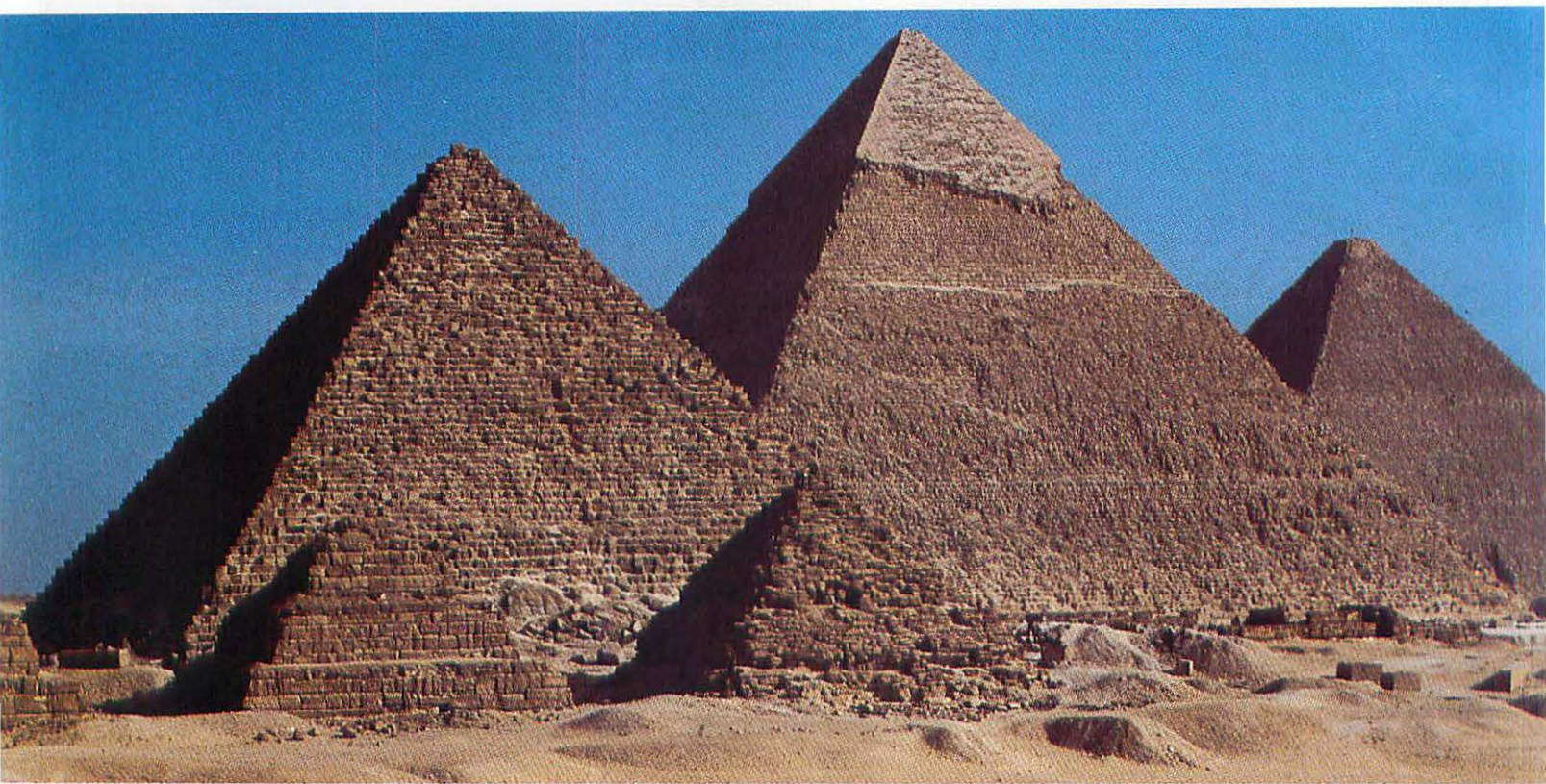
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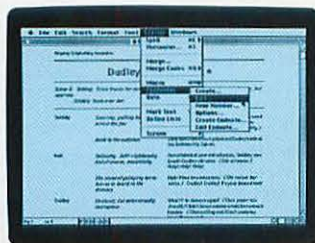
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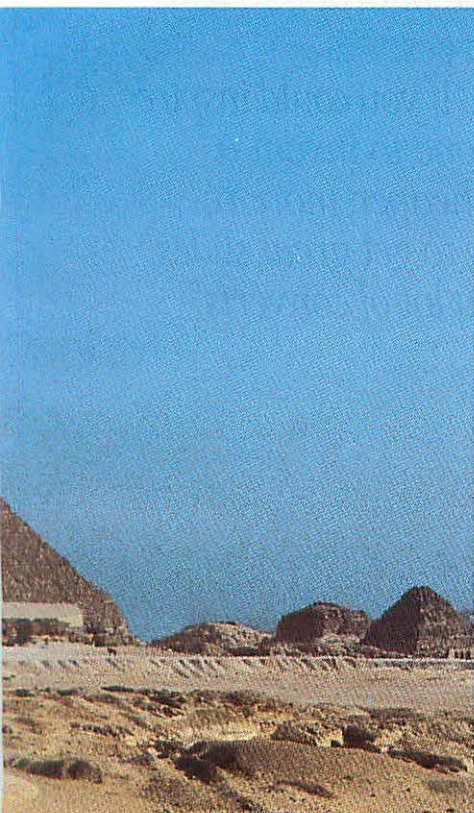
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(Left) WordPerfect offers parallel or newspaper-style column options. (Right) The interface is specially designed to be a familiar visual experience for Mac users.

for the Macintosh in



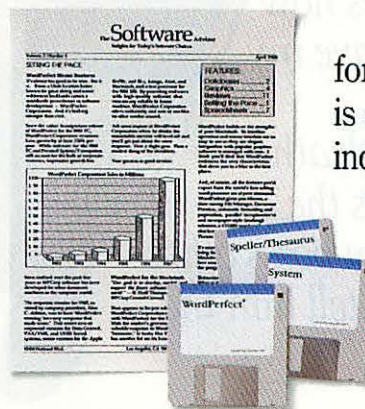
WordPerfect for the Macintosh offers extensive, fully integrated dictionary and thesaurus.

parallel and newspaper-style (snaking) column options displayed on screen; automatic formatting and pagination; and a file manager that lets you copy, delete, rename, or print a file right from one WordPerfect dialogue—or

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WordPerfect for the Mac also helps you compile professionally organized tables of contents, indexes, and outlines. It makes footnoting simple. And, using Print Preview, it lets you view your document in miniature so you can check its appearance before printing. Add to all of this a fully integrated, 115,000 word dictionary and a large, rapid-access thesaurus, and you’ve got the perfect tool for all of your word processing needs.



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WordPerfect for the Macintosh is designed for the individual, or for use in a shared environment. It’s compatible with files derived from WordPerfect 4.2 for the PC, Microsoft

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For more information, call or write WordPerfect Corporation, 1555 North Technology Way, Orem, Utah 84057 (801)225-5000.

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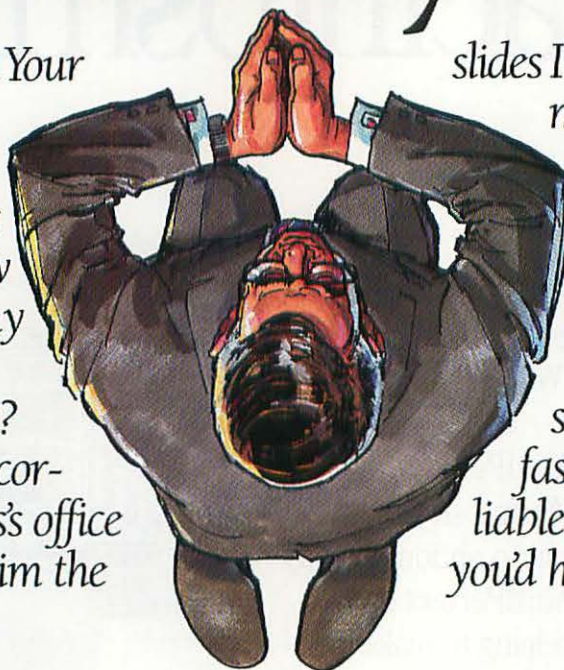
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New Products

*Information on the Mac's latest software,
hardware, and accessories*

Edited by Eileen Drapiza

This section covers Macintosh products formally announced but not yet evaluated by Macworld. All prices are suggested retail. Please call vendors for information on availability.

SOFTWARE

Adobe Illustrator Collector's Edition and Type Library Publishing Packs Edition I contains a medium-weight serif and sans serif typeface for creating logotypes, 100 borders, and more than 300 dingbats. Publishing Packs consist of typefaces that address specific business applications. Edition I \$125, Publishing Pack I: Newsletters \$395. Adobe Systems, 415/961-4400.

Alphabet Blocks Children's program teaches phonics and letter names. Includes parent/teacher manual and a Magic Touch Alphabet Book with textured letters. No reading skills required. 1MB min. memory. \$49.95. Bright Star Technology, 206/451-3697.

Business Letters to Go and 50 Classic Business Contracts Collection of 175 fill-in-the-blanks business letters, with online letter writing guide and commonly used contracts. \$49.95 each. Aardvark Software, 713/872-8085.

CADmover CAD/CAM file translation program that reads, translates, and writes graphic file formats including DXF, IGES, PICT, MiniCad (2-D and 3-D), MacDraw, and MSC/pal formats. 512K min. memory. \$495. CompServCo, 800/272-5533, 504/649-0484 in Louisiana.

Command Typographer Desktop typography package with user-definable kerning, automatic hyphenation and justification, online help. Outputs to PostScript devices. 1MB min. memory. \$495. The Software Shop, 516/785-4422.

CommCenter Provides a central directory of clients and contacts, electronic mail for in-office communications, telephone messages and contact logs for external communications tracking, automated dialing via modem, and a mail merge file generator that supports Microsoft Word and Document Modeler. Package includes a 4th Dimension run-time disk. \$189. Generation Four, 505/765-9666.

Complete Credit Checker and Nationwide SS#-Locate Checker provides access to the major credit networks; SS#-Locate reports names, age, and current and former addresses linked with this number. Solutions, 800/255-6643, 513/891-6145 in Ohio.

Computerized Atlas 3-D projection of the world. Contains facts such as population, square mileage, and monetary units for more than 2500 cities. \$49.95. 128K min. memory. Software Concepts, 203/357-0522.

Construction Estimating Plus Excel template designed for builders, remodelers, or subcontractors. Includes data control, estimates, check register. 512K min. memory. \$149. Lakeland Construction Software, 612/447-4750.

Contact Provides terminal emulation and data transfer between Macs and Unisys (Burroughs) mainframes. Emulates Unisys TD, ET, MT, and T27 terminals with concurrent multiple sessions and terminal pages; also, DEC VT100 and TTY. MultiFinder and Switcher compatible. \$395. Avenue Software, 418/682-3088.

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Stackware contains complete government guidelines, rules, and regulations for obtaining registered copyrights, trademarks, and patents. 1MB min. memory; hard disk recommended. \$49.95. Aardvark Software, 713/872-8085.

Cost/Schedule Workshop Helps plan, monitor, control, and estimate project costs and schedules. Forecasted Estimate at Completion \$299, Performance Measurement Data Analysis \$995. Leckie Associates, 603/424-7014.

Digital Darkroom Automatically traces bit-mapped images and converts them into objects. Imports/exports files in PICT, PICT-2, TIFF, MacPaint, SuperPaint, and Thunderscan formats; exports to EPS or Adobe Illustrator format. \$295. Silicon Beach Software, 619/695-6956.

DiskFinder Desk accessory file finder and disk cataloger. \$49.95. Williams and Macias, 800/752-4400, 509/458-6312 in Washington.

Dreams Integrated set of design tools. Includes drafting palette, accessory palette, dimension palette, and optional architectural symbol libraries. Full Mac II color support, keyboard entry, zoom up to 32X, advanced text handling, PostScript compatibility. Layers limited only by memory. \$500. Innovative Data Design, 415/680-6818.

DS Backup+ Hard disk backup utility. Features include interrupt and resume, timer for automatic backup, ability to back up or restore multiple drives, and ability to detect and avoid bad tracks on the destination disk. \$69.95. Electronic Arts, 415/571-7171.

(continues)

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—Réal Provencher

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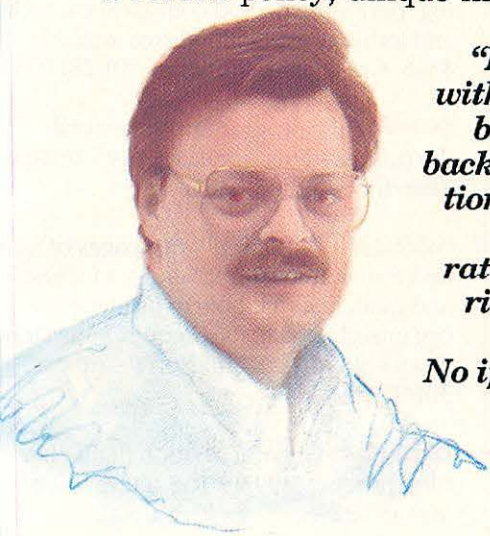
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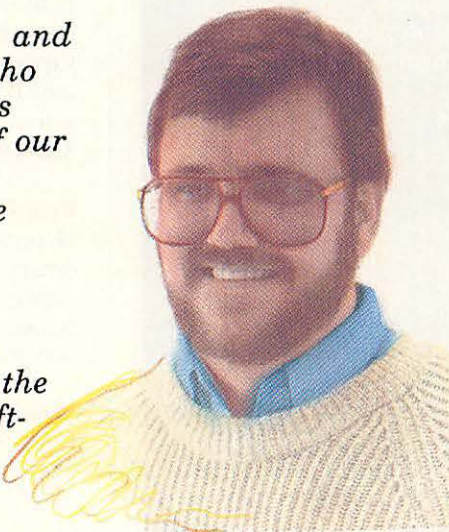
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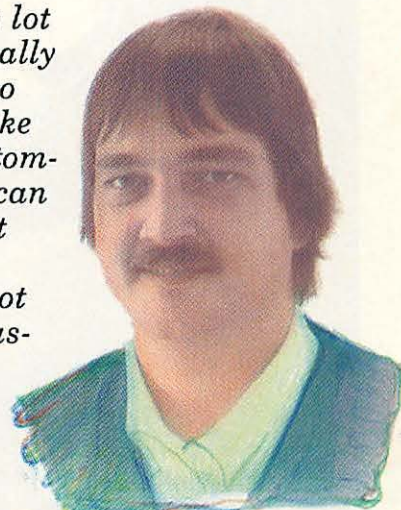
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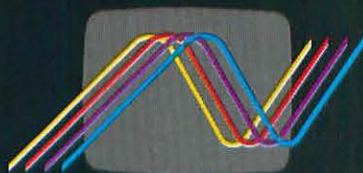
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C.R.T. Resolution:	1365 x 886
Typical Displayed Resolution: (Graphics controller dependent)	640 x 480, 800 x 600 non-interlaced
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Video Inputs:	RGBI-TTL, RGB-Analog
User Controls:	Brightness, Contrast, Power, Video input, Manual de-gauss, Height, Width, Horizontal shift, Vertical shift, TTL mode.
Cabinet:	Styled metal E-Series
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Extend Fully programmable general-purpose systems simulator. \$495. Imagine That, Inc., 408/365-0305.

Federal JobLink Twenty-five pages of forms and instructions for obtaining a federal job and guidelines for how to produce a well-organized application. Requires MacDraw \$49.95 plus \$3 s/h. Multisoft Resources, 301/977-6972.

Flight Plan General aviation flight-planning product. \$99.95. IGS International, 408/438-2276.

Font/DA Juggler Plus Utility lets you access up to 12 files containing fonts, desk accessories, F-keys, and digitized sounds as if they had been installed in the System file. Ability to compress fonts. \$59.95 plus \$3 s/h. Alsoft, 713/353-4090.

FontShare Allows Macs on a network to share downloadable PostScript fonts residing on a server. 512KE min. memory. \$29. Olduvai Corporation, 305/665-4665.

GeoQuery Geographic analysis of computer-based information. "Smart" maps accurately classify and pinpoint location of various data. For use in conjunction with data-base, statistical, and spreadsheet software. 1MB min. memory. \$349. Odesta, 312/498-5615.

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HyperSpell, Icon Factory, Script Expert HyperSpell verifies and corrects spelling in HyperCard. Icon Factory is a FatBits-style icon editor and art library containing over 250 sample icons. Script Expert lets you write HyperCard scripts by pushing

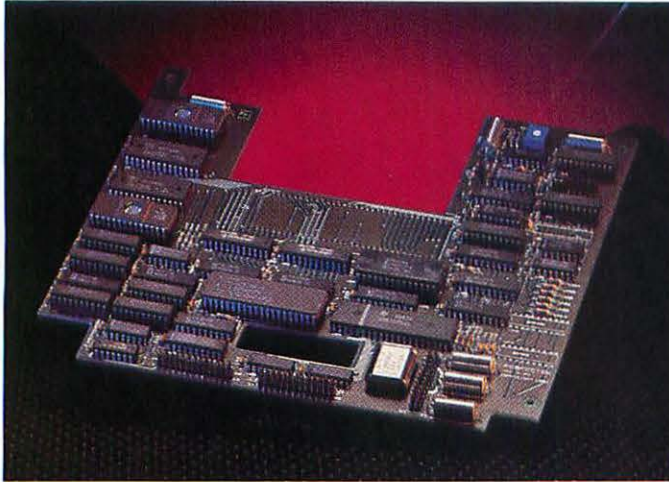
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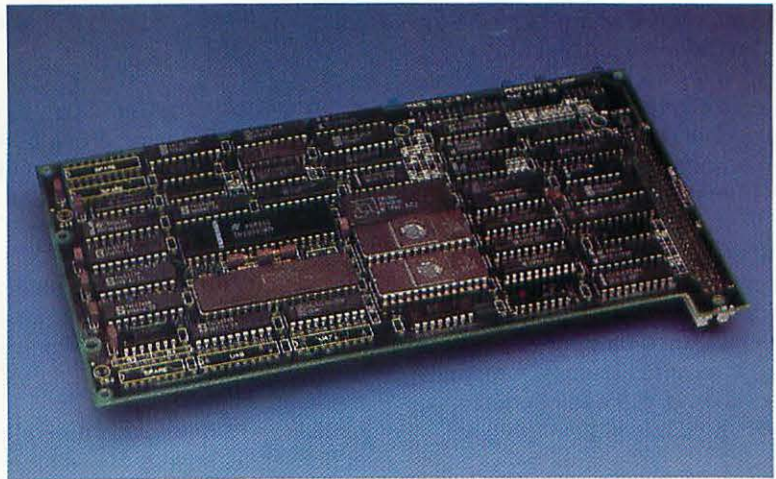
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New Products

buttons; it knows precise wording and programming rules for every command, function, message, and property in HyperCard. Icon Factory \$49.95, HyperSpell and Script Expert \$79.95 each. HyperPress Publishing, 415/345-4620.

Images with Impact Series PostScript clip art for desktop publishers. Graphics & Symbols 1 consists of Adobe Illustrator images for general use. Requires EPS-compatible program. \$99.95. 3G Graphics, 206/823-8198, orders 800/456-0234.

KaleidaGraph Data analysis and graphics presentation application. Lets you input raw data, edit and transform it, then plot and analyze it. 512K min. memory. \$179. Peripherals Computers & Supplies, 215/779-0522.

Language Systems FORTRAN Provides support for the full ANSI Standard FORTRAN 77 language, plus extensions such as DO WHILE, IMPLICIT NONE, and EN engineering number formatting. Adds the capabilities of the SANE, Apple's implementation of IEEE Standard 754 for Binary Floating-Point Arithmetic. \$295. Language Systems, 703/478-0181.

LaserTalk PostScript development environment allows interactive control of the PostScript interpreter and lets you view contents of the printer's screen buffer. Includes integrated editor and debugger, online documentation, and a dictionary browser. 1MB min. memory. \$249. Emerald City Software, 415/368-8303.

Liaison Software bridge allows you to dial into and share the resources of your office network. Features address book and network access password protection. 512KE min. memory; requires Hayes-compatible modem at each end. \$195. Infosphere, 800/445-7085, 503/226-3620 in Oregon.

MacMaster Templates, Aldus PageMaker Edition Graphics tablet driver with template overlay capabilities that enable software commands to be accessed directly from tablet surface. \$139, subtemplates \$69. AutoEase Inc., 800/752-3273, 801/224-8833 in Utah.

MacSQZ Compresses Microsoft Excel files up to 95 percent. Lets you assign pass-

words to files, maintain history of changes made to a file, and squeeze multiple files in a single operation. 512K min. memory. \$79.95. Symantec, 408/253-9600.

MenloCom Connectivity software that allows applications running on Tandem Computers to communicate with Mac presentation applications. Price to be announced. Menlo Business Systems, 415/948-7920.

Music Publisher Object-oriented music notation package with automatic part extraction and selective transposition. 512K min. memory. \$195. Shaherazam, 414/442-7503.

Nexpert Object Mac II expert-system development program. Supports both object-based and rule representations, includes incremental compiler, and allows calls to external programs. Cross-compatible with Nexpert Object on VAX and IBM AT PS/2 versions. MultiFinder compatible. \$5000. Neuron Data, 415/321-4488.

Nisus Word processor includes integrated graphics tools. Keeps track of page, section, and line numbers. Search and replace can be font- and/or style-sensitive. Counts characters and words, calculates average word length. 512KE min. memory. Approximately \$200. Paragon Concepts, 800/922-2993, 619/481-1477 in California.

PICT Detective Symbolic analysis of any valid QuickDraw picture; provides structured description of objects from a standard PICT file or reads directly from a PICT resource. \$69.95. Palomar Software, 619/727-3922.

Presentation Planner Helps analyze an audience and organize text and audiovisuals. \$195. Discus Electronic Training, 716/248-4300.

Publisher's PicturePaks Three clip-art collections: Executive & Management Edition, Finance & Administration Edition, Sales & Marketing Edition. MacPaint or EPS files. Fully cataloged and documented libraries. \$99.95 per edition, set of three \$250. Marketing Graphics, 804/788-8844.

RefMaker Downloads references from Brs/Medline or Biosis to a database or HyperCard stack. Assembles references into any format required; more than 20 formats supplied. \$49. Cat's Cradle Software, 313/665-6152.

Retrospect File archiving program features disk and archive browsing, automatic operation, and volume printing. Price to be announced. SuperMac, 415/962-2900.

Roundup Utility lets you search file contents for a given character string. Displays file name, path to the file, and search string in context. \$29.95. Virginia Systems Software Services, 804/739-3200.

SCSI Tool Utility assists in development of SCSI hardware and software by enabling user to create, edit, and execute SCSI commands. \$175. Arborworks, Inc., 313/747-7087.

Simply Accounting Integrates general ledger, payables, receivables, payroll, inventory, and project cost. 1MB min. memory. \$349. Bedford Software, 206/883-0074.

StatView II Interactively explores and analyzes data; creates publication-quality charts using a Mac II's 16 million colors. Requires Mac II. \$495. Abacus Concepts, 415/540-1949.

Tax Guide for Small Business Two-disk stackware set. Comprehensive coverage of IRS Publication #334, *Income, Excise, and Employment Taxes for Individuals, Partnerships, and Corporations*. 1MB min. memory; hard disk recommended. \$79.95. Aardvark Software, 713/872-8085.

Teach Yourself Training Guides Series of training guides for PageMaker, HyperCard, 4th Dimension, Omnis 3, Microsoft Excel, Word, and Works. Includes brief explanation of each concept, instructions, and a screen copy illustrating the progression as commands are executed. Comes with stand-up easel binders and training disks. \$69.95 per guide. Tutorland, 408/973-0472.

Touch OSI Mac Developer's Kit Enables software developers to implement network-based applications utilizing industry-standard OSI protocols. Kit consists of protocol stack, Touch Programmatic Interface, programmer's reference manual, source header files, and selection of examples. Includes end-user utilities for filing and remote printing. \$545. Touch Communications, 408/438-7927.

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VideoWorks II Driver for HyperCard HyperTalk extension that calls up the VideoWorks driver from stacks. Enables user to create database of animation and sound documents, or use the clip animations to enhance stackware. \$99.95. Brøderbund Software, 415/492-3200.

Xerox 4020 Printer Driver Includes basic set of outline fonts that print to 120-dpi resolution. Thirteen LaserWriter typefaces; special effects like underline, shadow, outline, and rotation. Works only with Cricket products; does not support AppleTalk. \$149. Cricket Software, 215/251-9890.

HARDWARE

AX/2472 Modem capable of achieving error-free throughput of 7200 bps over standard telephone lines. Employs Microcom Networking Protocol Class 7. Features Enhanced Data Compression. \$899. Microcom, 617/762-9310.

Bit Pad Plus A 12-by-12-inch graphics tablet based on charge ratio. Comes with a stylus and special interface device for the Mac SE and II. \$495. Summagraphics, 203/384-1344.

CMS PRO100SE/r, CMS PRO150-II/i, CMS PRO300-II/i 100MB internal hard disk for Mac SE allows both internal floppy disk drives to stay inside the SE; 25-ms average access time. 150MB and 300MB internal SCSI hard disks for Mac II have average seek times of 16.5 ms. CMS PRO100SE/r \$1895, CMS PRO150-II/i \$2995, CMS PRO300-II/i \$4295. CMS Enhancements, 714/259-9555.

ColorVue SE Color video interface card allows SE users to display and print color from their applications. Displays up to 16 colors from a palette of 4096 on a monitor that is 75 percent larger than the SE screen. Features horizontal panning and automatic screen saver. \$695. Orchid Technology, 415/683-0300.

CopyMaker Plus Robotic disk handler performs copying, labeling, and printing operations. \$15,590. Applied Data Communications, 714/731-9000.

DataShow LCD projection pad allows display of electronic transparencies using any transmissive overhead projector. Features invert mode and contrast control. \$1495. Kodak, 716/724-3169.

DoubleTime-16 Accelerator card doubles Mac SE speed. Allows you to switch between 8MHz and 16MHz modes using the control panel desk accessory. \$395. Aox Inc., 617/890-4402.

EM330 SCSI hard disk with formatted capacity of 328MB, 20-ms average seek time, built-in power supply, interface cable, driver, and utility software. \$4895. Priam, 408/434-9300.

ExpanSE Plus Chassis System, SCSI Disk Option Lets Mac Plus utilize SE option cards. Comes with Mac Plus interface card; internal and external cables; and the expansion chassis, which contains an 80-watt power supply, a cooling fan, the chassis system board with four 96-pin connectors to mount four SE option cards, and four I/O ports. Optional 80MB SCSI disk. ExpanSE Plus Chassis System \$995, 80MB disk \$2995. Second Wave, 512/343-9661.

FaxPlus Combines a 9600-bps facsimile modem with a 2400-bps Hayes-compatible modem. Software features unattended error recovery, activity journal, time and date stamp, sender identification, auto redial. \$850. Cypress Research, 212/475-7782.

GatorBox Integrates Mac into Ethernet network environments. Comes preconfigured with network interfaces for LocalTalk network and Ethernet or ThinEthernet. Price to be announced. Cayman Systems, 617/494-1999.

Irwin Backup Tape Drives Self-powered SCSI backup systems that use DC 2000 minicartridge tapes. Comes with EzTape/Mac control software for image backup and streaming file-by-file backup. 40MB backup \$1395, 64MB \$1595. Irwin Magnetics, 313/996-3300.

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IS/ADB Input System Tablet, 8½ by 11 inches, comes with corded pen. Supports the ADB port on the Mac SE and II. \$395. Kurta Corp., 602/276-5533.

MacLab Data acquisition system measures data, provides hard copies of oscilloscope tracings, compares waveforms, and saves data for later analysis. \$2925. World Precision Instruments, 203/469-8281.

MacTape/SCSI Nine-track autoloader tape drive allows Mac to read and write magnetic tape at 800/1600/3200/6250 bpi, via the SCSI port. Includes utilities to read and write tapes, move tape by block or file, and back up and restore individual or multiple files. Tridensity version \$7695, quad-density version \$10,500. Blackhole Technology, 617/721-7690.

Micron Add-in Memory Memory expansion kits consisting of SIMMs, each of which supplies 1MB of memory with eight 1MB dynamic RAM components. Includes installation guide. 2MB \$599, 4MB \$1199, 8MB \$2399; 1MB Mac II kit \$249. Micron Technology, 208/383-4000.

Mirus FilmPrinter Digital film recorder supports up to 16 million colors and 8000 lines of addressable resolution. Generates photo-lab quality, 35mm color slides. Under \$6000. Mirus Corporation, 415/949-5544.

PageView Fifteen-inch portrait-mounted display with 8-by-10-inch viewing area. Two resolution modes: 144 dpi, 72 dpi. Includes adapter board. \$1500. Sigma Designs, 415/770-0100.

Rodime Drives External hard disks with formatted capacities of 62MB, 104MB, and 144MB. Average seek time 28 ms. Rodime 60 Plus \$1795, Rodime 100 Plus \$2295, Rodime 140 Plus \$2595. Rodime, 305/994-6200.

Silver Sentry Series Mass storage devices with optional Mac II logic board, file server software, disk cache, and selection of cabinets. Average access time 18 ms. Comes with backup software plus collection of

more than 30MB of public domain software. 850MB model starts at \$19,995; available in capacities up to 14 gigabytes. Hard & Soft, 305/772-0430.

ST3 Programmable, 68000-based, 12.5 MHz gateway connects non-Apple peripherals to AppleTalk. Performs user-supplied polling protocols, device-specific data edits, and handshaking. Supports 64K of program ROM and up to 1MB of downloadable, user-supplied application. Synaptic Technologies, 714/859-0570.

TraceLink Interface box enables you to use any RS-232C graphics digitizer with Mac applications. Conex Electro Systems, 206/734-4323.

ACCESSORIES

Desk Organizer Wooden platform for the Mac holds both external and hard drives. Keyboard or other peripherals fit underneath. \$30. Harwell Consulting Services, 213/433-3807.

HyperDialer Automatically dials telephone numbers from HyperCard without tying up the Mac's serial port. \$34.95. Datadesk International, 818/780-1673.

Mousetrap Storage and swivel stand with a 9-by-12-inch footprint. \$54.60 plus \$4 s/h. Gered Corporation, 503/591-8658.

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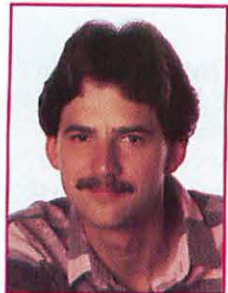
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Quick Tips

Answers to your questions

by **Lon Poole**

The other day William P. Benz stopped in at the *Macworld* offices to demonstrate MapGrafix, a sophisticated geographic information system for the Macintosh (Com-Grafix, Portland, Oregon, 503/285-1745). Instead of lugging his Mac in the usual padded bag, he wheeled it along on a folding luggage cart. Strapped in with bungee cords, a complete Macintosh system can travel securely.

At department stores you might pay as much as \$80 for a rugged cart, but Best stores offer two models, each only \$19.95. Benz has found the larger, big-wheeled Monarch Luggage model more practical for negotiating stairs.

Q Changing System Fonts

How can I change the fonts the System (version 5.3) uses? I use MacDraw with a LaserWriter and wish to remove the Geneva, Monaco, and Chicago fonts from my System. I'd rather use Helvetica and Times, but Font/DA Mover won't let me.

*Tom Fine
Harrison, New York*

A I assume you want to remove fonts to gain more space on your system disk. If you have a Mac II, an SE, a Plus, or a 512KE, Chicago 12 needn't cost you any disk space because it's built into the ROM of those models. In addition, Mac SE and Mac II ROMs contain Geneva 9, Geneva 12, and Monaco 9. However, these fonts are du-

Lon Poole answers readers' questions and offers advice in this monthly column. A collection of his compiled tips can be found in Mac Insights (Microsoft Press, 1987).

plicated in the System file on disk even when they're in ROM.

You can remove any fonts from the System file by using ResEdit version 1.1B3 (July 14, 1987) or higher; it's available from most user groups. Follow these steps:

1. Make a copy of the system disk you want to change.
2. Start ResEdit, insert the system disk copy, and open first its System Folder (if any) and then its System file.
3. Open the FONT resource. You'll see a list of every font size in the System file.
4. Select each font size that you want to remove, and choose Clear from the Edit menu.

5. Close the FONT window and the System window. Click Yes to save changes.

If you remove Chicago 12, Geneva 9, Geneva 12, or Monaco 9, but that font is not in your Mac's ROM, to avoid ugly-looking text you should designate another font to replace it by using ResEdit as follows:

1. If you haven't already done so, follow Step 2 above.
2. Open the FOND resource. You'll see a list of the font family names, such as Chicago and Geneva, with their ID numbers.
4. Select the font family to be replaced and note its ID number (Chicago is 0, Geneva is 3, and Monaco is 4). Choose Clear from the Edit menu.
5. Select the replacement font family name, choose Get Info, and in the space provided, change the ID number to the one you noted in the previous step.

6. Repeat steps 4 and 5 for each font you want to replace. Then close the FOND window and the System window. Click Yes to save changes.

That's all there is to it. Remember, when the Mac changes system disks, it uses fonts from the new System. You may have to modify more than one system disk.

I don't recommend replacing Chicago 12. It's one of the few fonts that contain

the π -key and Apple symbols, which appear in menus. Also, Chicago 12 is used for button and menu text. When it's dimmed (shaded gray), you can still read it, whereas most other fonts are illegible when dimmed.

Warning: Although I've tried these changes with several applications, I haven't done extensive testing. Some applications may not work correctly without Chicago 12, Geneva 9, Geneva 12, and/or Monaco 9. Be sure to make changes on a copy of your system disk first, and use the modified copy to test your application before putting the new system disk into service.

Q Getting the Quotes Right

How can I replace plain quotation marks (" ") in a word processing document with open and close quotes (" ")? A simple search-and-replace changes all plain quotes to either open or close quotes, rather than pairs of open and close quotes.

A Macify shareware by Eric Celeste converts plain quotes (double or single) in a text-only file to open and close quotes. It also changes apostrophes to open and close single quotes, double hyphens to long dashes, the *fi* and *fl* combinations to ligatures, and more. *Macify* is available from most user groups that have software libraries (call 800/538-9696 ext. 500 for the name of a group near you).

HyperCard can also make intelligent replacements in text documents. The script shown in "Quote Converter" replaces plain quotes with pairs of open and close quotes with the help of two external functions (XFCNs), **fileName** and **newFileName**, by

(continues)


```

on mouseUp
    global openQ, closeQ, balance
    put "" into openQ
    put "" into closeQ

    --get source file name from std Open dialog (using an XFCN):
    put fileName("TEXT") into source
    if source is empty then exit mouseUp --user cancelled

    --get destination file name from std Save dialog (using an XFCN):
    put lastThing(":",source) into it --extract source file name from path
    put newFileName("Save conversion as:",it & ".Q") into dest
    if dest is empty then exit mouseUp --user cancelled

    set cursor to 4 --watch
    open file source
    open file dest
    put 0 into balance --keeps track of whether quotes balance
    repeat
        read from file source for 16384 --read 16K chunks
        if it is empty then exit repeat --end of file?
        write convertQuotes(it) to file dest
    end repeat
    close file source
    close file dest
    set cursor to 0 --normal
    if balance is 1 then
        answer "Oops! Quotes didn't balance."
    end if
end mouseUp

--Convert all quotes in variable it to open- & closed- quote pairs
--If the number of quotes is uneven, variable balance is 1
function convertQuotes it
    global openQ, closeQ, balance
    put 0 into qCount
    put offset(quote,it) into cNbr --find the first plain quote
    repeat until cNbr is 0
        add one to qCount --count this conversion
        if qCount mod 2 is 1 then
            put openQ into char cNbr of it --Odd nbr of quotes so far
        else
            put closeQ into char cNbr of it --Even nbr of quotes so far
        end if
        put offset(quote,it) into cNbr --find the next plain quote
    end repeat
    --keep track of whether quotes balance:
    put (qCount mod 2 + balance) mod 2 into balance
    return it
end convertQuotes

--Function lastThing extracts the part of string s
--that follows the last instance of character c
function lastThing c,s
    if c is in s then
        put lastThing(c,char offset(c,s)+1 to length(s) of s) into s
    end if
    return s
end lastThing

```

Quote Converter

This HyperCard script converts pairs of plain quotes ("") in any text document to pairs of open and close quotes (" "). It requires two external functions (XFCNs): **fileName** and **newFileName**, which are available from user groups.

Andrew Gilmartin. The **fileName** function lets you pick the file to be converted from a standard Open dialog box. The **newFileName** function lets you specify the name and folder location of the new converted file. You can get these XFCNs from most user groups, such as BMUG in Berkeley, California, 415/549-BMUG or 415/849-9114. (Other user group librarians: Please send me catalogs of your disk libraries so I can mention your groups.)

If you can't find these external functions, you can type the file names in response to Ask commands. In the script, replace the line that contains the **fileName** function with the following:

```

ask "Document to convert"
put it into source
And replace the line that contains the
newFileName function with the following:
ask "Name for converted
document" with it & ".Q"
put it into dest

```

Faint Graphics

I created a letterhead with MacPaint and pasted it into my MacWrite documents. I can't figure out why it looks black in MacPaint but looks gray when printed in Best quality mode on an ImageWriter as part of a MacWrite document.

Ed Grier

Port Angeles, Washington

This classic complaint seems no longer to be a problem with the latest ImageWriter driver software (version 2.6 or higher). The version number appears in small type in the dialog boxes you see when you choose Print or Page Setup from most File menus, including MacWrite's. You can get the latest version from an Apple dealer or a user group.

Creating a Legend

Tip: Legends that Excel automatically draws for charts can change a chart's size, and they can't be moved or resized. You can create your own legends without these limitations by using unattached text.

To make a key for one of the markers in the chart, type some blank unattached "text" (by pressing the space bar). Then choose Pattern from the Format menu and

(continues)

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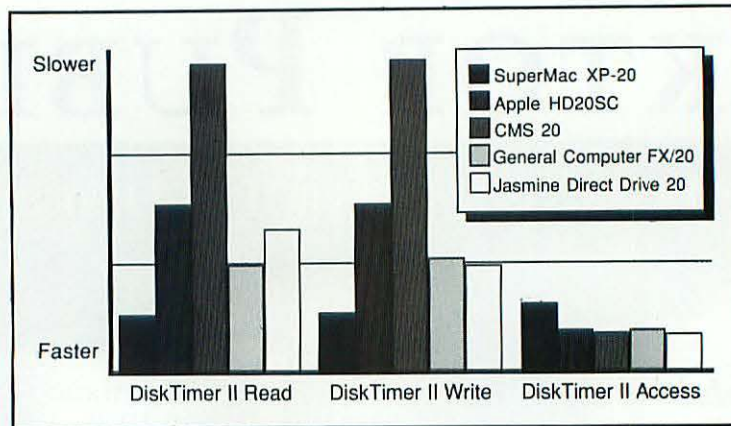
pick border and background patterns to match the marker. Resize the key by dragging a handle at one of the corners or sides of the key. Move the key by dragging its center. Label the key with additional unattached text.

Put a border around the custom legend by creating more blank unattached text and selecting a black border using the Pattern command. Move and size the border to fit around the custom legend.

Gerald L. Gherardini
Karen A. Fabrian
Springfield, Illinois

For best results, I recommend creating the border first. Excel layers unattached text in the order you create it, and you don't want the border to cover the legend (see "Custom Chart Legend").

Custom legends created from unattached text do have a couple of limitations. For one, it may be hard to find space for a custom legend in the chart window, because Excel always draws the chart to fit the window. Also, moving an



Custom Chart Legend

When Excel's standard legends won't do, create your own using unattached text.

entire custom legend is tedious, because you have to move the unattached text elements individually and then realign them all at the legend's new location.

Excel Find-and-Replace

Tip: Excel has a Find command that searches a selection for cells with a value or formula you specify, but it has no Replace command for changing the cells it finds. I wrote a macro that finds cells and replaces their contents according to your specifications (see "Fix Cells"). It can be very valuable when you find out that some-

one consistently entered part of a batch of data incorrectly on a large worksheet.

Before using the macro, you must select the cells you want to fix. Otherwise the macro searches the whole worksheet. The selection can be any size or shape.

When you use the macro, you first specify whether to look for cells containing numbers or text. Then you enter the cell contents to be found, followed by the

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	A	B
1	Fix Cells (f)	Fix Cell Values Option-Command
2	=ECHO(0)	Suppress screen changes during execution
3	=ALERT("Press cancel if you have not selected the correct range of cells",1)	Caution on selection, otherwise will do whole spreadsheet
4	=IF(A3=FALSE,GOTO(A29))	If CANCEL button is pressed, Exit
5	=INPUT("Is the Incorrect Information a Number or Text? Enter N or T:",2,"Fix Cells")	Identify existing field as a number or text
6	=IF(A5=FALSE,GOTO(A29))	If CANCEL button is pressed, Exit
7	=IF(A5="T",GOTO(A12))	If code is for "text", go to Type 2 Input statement
8	=IF(A5<>"N",GOTO(A5))	If code is not number, repeat Question, else fall through
9	=INPUT("Enter the Incorrect Number here:",1,"Fix Cells")	Enter numeric value to be changed
10	=SET.VALUE(A12,A9)	Put value in Cell so it can be found in Active.Cell compare below
11	=IF(A9=FALSE,GOTO(A29),GOTO(A14))	If CANCEL button is pressed, Exit, else go to next Input
12	=INPUT("Enter the Incorrect Text here:",2,"Fix Cells")	Enter text value to be changed
13	=IF(A12=FALSE,GOTO(A29))	If CANCEL button is pressed, Exit
14	=INPUT("Enter the Fix here:",2,"Fix Cells")	Enter the fix here, either text or number
15	=IF(A14=FALSE,GOTO(A29))	If CANCEL button is pressed, Exit
16	=MESSAGE(1,"Fixing all cells in selection")	Put message at top of screen
17	=ROW(Active.Cell())	Determine starting row
18	=COLUMN(Active.Cell())	Determine starting column
19	=SET.VALUE(A25,0)	Set value of counter to zero
20	=GOTO(A23)	Skip "starting cell" check for first cell
21	=SELECT("RC(1)")	Bump one cell for next compare
22	=IF(AND(ROW(Active.Cell())=A17,COLUMN(Active.Cell())=A18),GOTO(A23))	Check for return to "starting cell"
23	=IF(Active.Cell()<>A12,GOTO(A21))	Check match for incorrect text, fall through to fix or repeat loop
24	=FORMULA(A14)	Place corrected value in cell
25	=A25+1	Add 1 to counter for cells changed
26	=GOTO(A21)	Repeat loop
27	=ALERT(A25&" values converted",2)	Display count of cells changed
28	=MESSAGE(FALSE)	Cancel message at top of screen
29	=RETURN()	Exit

Fix Cells

This Excel macro finds and replaces the contents of cells in a selection according to your specification.

replacement contents. The macro uses different Input statements to distinguish between numeric and text entries. If you want to find and replace formulas or other types of cell contents, change lines 5 through 15 to accept that type of entry. For example,

you could accept input of a formula by changing lines 5, 8, and 9 as follows:

```
=INPUT("Is the Incorrect Information a
Formula or Text? Enter F or T:",2,"Fix Cells")
=IF(A5 < > "F",GOTO(A5))
=INPUT("Enter the Incorrect Formula here:",
0,"Fix Cells")
```

The numbers 0, 1, and 2 in the Input statements designate an entry as a formula, a number, or text, respectively.

Paul E. Mack
Dubuque, Iowa

MultiFinder Credits

Tip: If you press Option-⌘ while choosing About MultiFinder from the Apple menu, you'll be presented with movie-style credits for MultiFinder. I hope this provides hours of amusement.

Mike McKinnon
Olympia, Washington

HyperCard and Desk Accessories

Tip: Using desk accessories with HyperCard is troublesome, because you must close them before you can get back to HyperCard. David Oster's public exchange desk accessory WindowsDA will keep a DA open for you. (There is also another windowing DA called Windows, by Marshall Gosnell. It probably works the same way, but I haven't tried it.)

After choosing WindowsDA from the Apple menu, you can make HyperCard active by clicking its window behind an

(continues)

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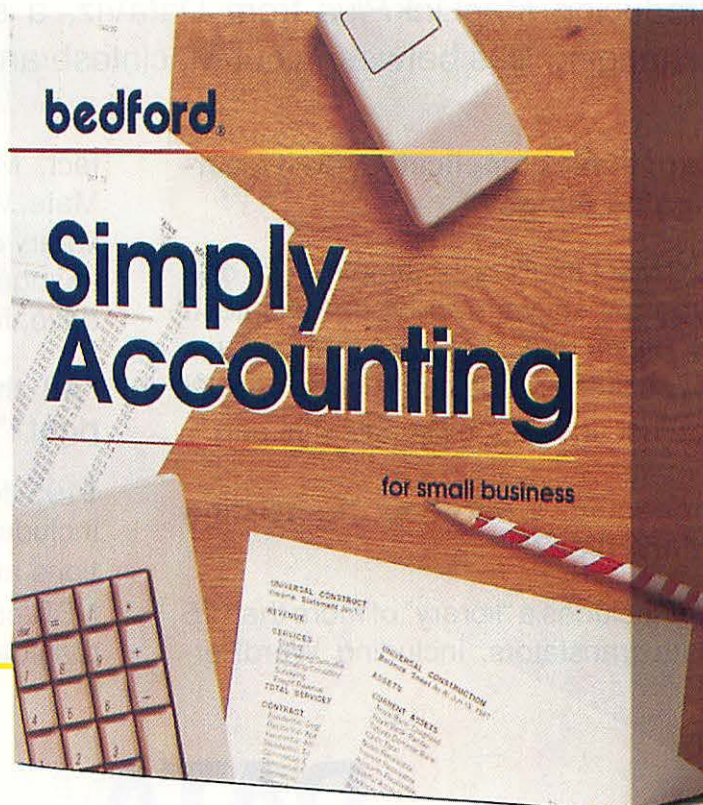
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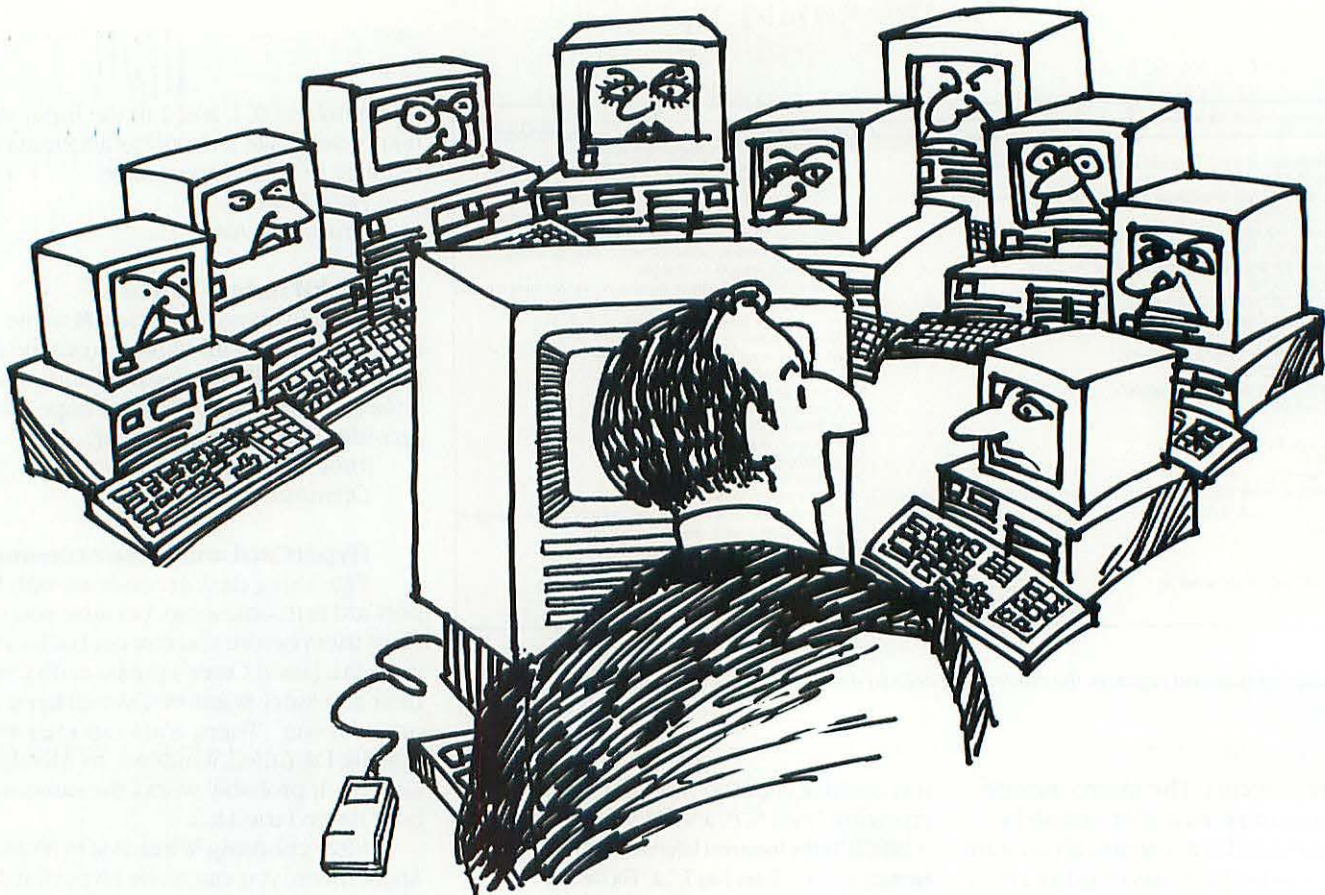
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How To/Quick Tips

open desk accessory. Then to access an open desk accessory, choose it from the WindowsDA menu, which now appears in the menu bar.

Warning: The WindowsDA menu disappears from the menu bar if you choose any paint tool. To get it back, you must quit HyperCard. Still, this solution requires less memory than either Switcher or MultiFinder.

Judy Engelsberg
New Milford, New Jersey

I haven't used WindowsDA, but Gosnell's Windows 1.1 works exactly as you describe. It's available from user groups and online information services.

Print Merge by Numbers

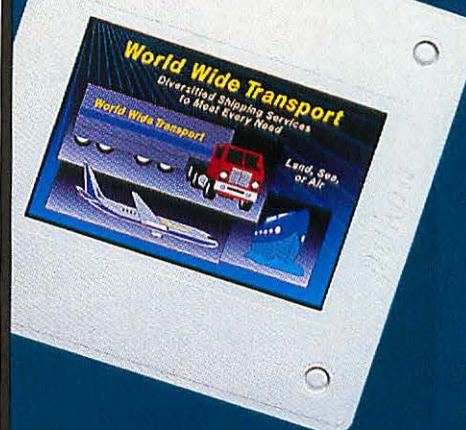
Tip: Microsoft Word 3.01's Print Merge command lets you include all records from a data document or a range of records specified by beginning and ending record numbers. However, determining record numbers is tricky because you have to count records manually.

The solution is to choose the Renumber command from the Document menu in order to assign a number to every record. Specify a starting number of 0, which Word then assigns to the first record (the header record). Word automatically places a tab character after every record number, effectively adding another field at the beginning of every data record. The extra field does not interfere with the Print Merge command nor does it appear in your form letters, mailing labels, or any other merge-printed documents.

Paul McKinnon
Downsview, Ontario, Canada

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Getting Started with Color

From bitmaps and pixmaps to color wheels and CLUTs, a look at how color fits into the Macintosh world

by Jim Heid

The color capabilities of the Apple II helped make that machine a classic. But until recently, the Macintosh has lived in a black-and-white, or *monochrome*, world.

Did the Mac's designers have an aversion to color? No. The Mac was born color-blind more because of economics than aesthetics. Apple was determined to keep the Mac's size and cost down, but to give it a screen with enough resolution to display sharp graphics and a variety of fonts. Special high-capacity memory chips would have allowed Apple to shoehorn color capabilities into the Mac, but such chips were scarce and expensive in the early eighties. Moreover, the additional processing demands imposed by color would have made the original Mac unbearably slow—a pace it was approaching anyway.

But times change. Nowadays, high-capacity memory chips are plentiful and less expensive. In refining the Mac's system software, Apple has provided a sturdy foundation upon which to build future color Macs.

What Eight Bits Will Buy

Before looking at how color fits into the Macintosh world, let's examine how the Mac II displays color images. *Getting Started* readers will recall from previous columns that the Mac uses a *bitmapped* display (in Mac lingo, a color bitmap is

Jim Heid is a contributing editor who each month focuses on a different aspect of Mac fundamentals.



JOHN HERSEY

called a *pixmap*). Each screen dot, or *pixel*, corresponds to one bit in the Mac's memory. When a given bit has a value of 1, its corresponding pixel is on, or black. When a bit has a value of 0, its pixel is off, or white.

Because a bit can have only one of two values (1 or 0), a bitmapped display that uses one bit per pixel can display only two colors: black and white. Shades of gray can be simulated by *dithering*, in which groups of pixels are combined into patterns. The

Mac's gray desktop is an example of a dithered pattern formed by evenly spaced, alternating black and white pixels.

The secret to displaying color or true shades of gray is to assign additional bits to each pixel. Each additional bit lets the Mac II store more information about the pixel. Two bits per pixel can represent four colors. Four bits can represent 16 colors, and

(continues)

eight can represent 256 colors. You can tell the Mac II how many bits to assign each pixel by changing the Monitors setting in the Control Panel (see "Bits and Pixels").

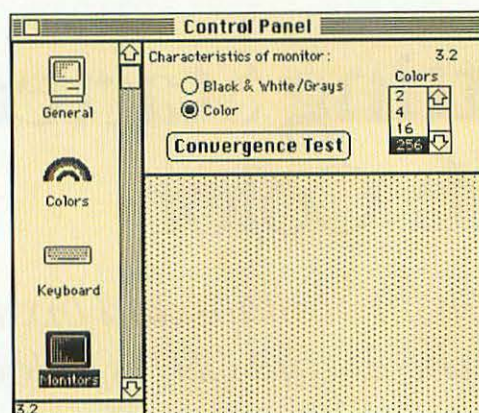
But how can only two bits represent four colors, or eight represent 256? In the video circuitry of a Mac II, the bits that represent each pixel can be on (assigned a value of 1) or off (assigned a value of 0) in different combinations. For example, when two bits are assigned to each pixel, four on/off combinations exist: both bits on; both bits off; first bit on, second bit off; first bit off, second bit on.

When four bits are assigned to each pixel, you get 16 on/off combinations. With eight bits per pixel, you get 256 combinations. Internally, the Mac II can use up to 24 bits to describe colors, giving it the ability to create more than 16 million different hues. But the number of colors that can actually be *displayed* at once depends on the video board you use. Because the Mac II's expanded video board assigns a maximum of eight bits to each pixel, it can display a maximum of 256 colors simultaneously.

So the Mac II's first step in determining a pixel's color is to determine the value of each of the pixel's bits. If you're using four bits per pixel, the value of each bit is a number between 0 and 15 (one of the 16 possible on/off combinations of that pixel's bits). The Mac II uses the resulting number to retrieve a color description from a *color look-up table*—the next stop on our tour of the Mac II's color capabilities.

A Pixel Is Born

These are the steps that bring color to the Mac II's screen. The process is the same whether you are using 2, 4, 8, 16, or 24 bits per pixel.



Bits and Pixels

The Control Panel's Monitors extension lets you specify how many bits the Mac II should assign to each pixel, and whether it should display colors or shades of gray. Expanded Mac II video cards can display 256 simultaneous colors or grays, while unexpanded cards are limited to 16.

I'd Like Three Pixels of Colonial Red...

If you've seen someone at a paint store mix a special color, you're well on your way to understanding color look-up tables (also called *CLUTs*, but not by me). When you buy a custom color, a store employee leafs through a paint-stained book to find the number of the color you want. Next to that number is a "recipe" listing the correct quantities of the appropriate pigments that must be blended to create the final color.

Now imagine that the Mac II's video circuitry is the paint store employee. Given a number that represents the state of the pixel's bits, the circuitry leafs through the color look-up table—which can hold the recipes for 256 different colors—to find

the recipe corresponding to the number. The recipe consists of three numbers that tell the circuitry how much red, green, and blue light is required to create that color.

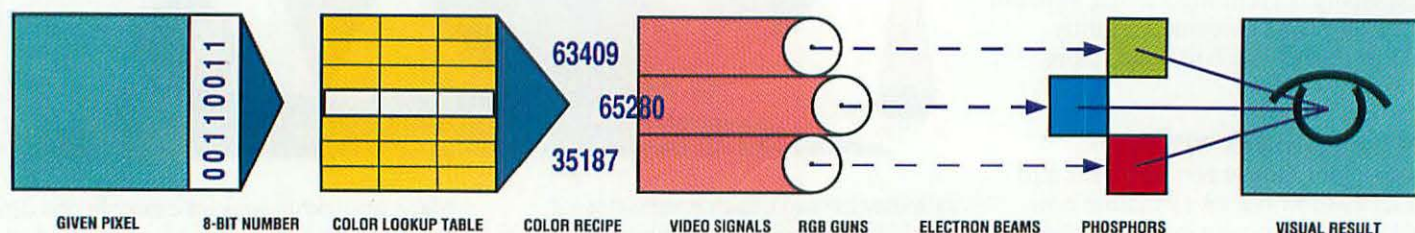
Next, the video circuitry generates electrical signals that control the red, green, and blue electron guns located in the back of the monitor's video tube. Each gun squirts a beam of electrons at the tube's display surface, which is coated with red, green, and blue phosphor dots. The phosphor glows briefly, but just long enough for your eyes to see the glow and detect varying degrees of red, green, and blue light. Because the dots are too small to be seen individually, they appear as a single colored pixel (see "A Pixel Is Born").

Satisfying Your Palette

Working with one color look-up table sounds hard enough, but the Mac II's capabilities don't end there. A system software component called the Palette Manager lets the Mac II load different color look-up tables into and out of the video board's memory.

This capability is especially important for image-scanning or color-painting applications. The 256 color descriptions that a look-up table can hold might seem like a lot, but they aren't enough to accurately render gradual color shifts and variations in shading. The solution is to create custom palettes in which unused colors are replaced with ones customized for the task at hand. For example, a portrait artist might replace the brilliant blues and Day-Glo greens in the palette with an expanded choice of flesh tones, while a landscape ar-

(continues)



Video circuitry examines the bits for a given pixel to determine their value. For 8 bits per pixel, each bit's value is represented by a number between 0 and 255.

This number is used to retrieve a corresponding color description from the color look-up table.

Video circuitry generates three electrical signals corresponding to the amount of red, green, and blue light required to create the color described by the color lookup table.

These signals are sent to the monitor, whose red, green, and blue electron guns fire electron beams at the tube's phosphor, causing it to glow briefly.

Your eyes see the small triads of glowing red, green, and blue phosphor, and merge them to create the image of a single, colored pixel.

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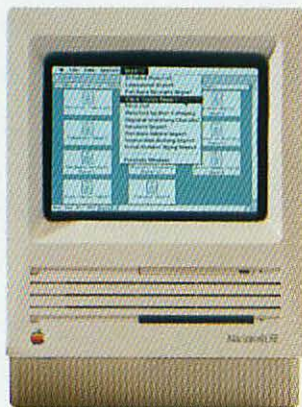
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tist might prefer numerous shades of green and blue. The Palette Manager works with another system software component, the Color Manager, to make that possible.

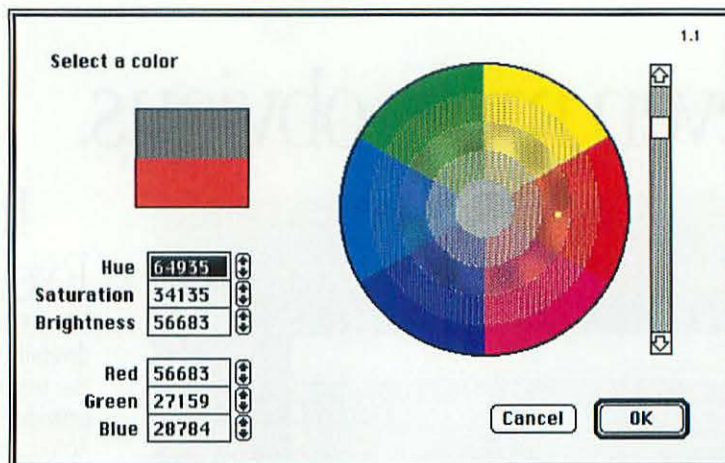
Another way to get more simultaneous colors is to buy a 24-bit video card such as RasterOps' ColorBoard 1/104, SuperMac's Spectrum/24, or Jasmine's Rembrandt-II or Rembrandt-III. All assign 24 bits to each pixel, giving you direct access to 16.7 million simultaneous colors. But with a price tag in the \$2000 to \$3000 range, one of these superboards can easily turn your bank balance bright red. (For more details on these video cards, see "Color Graphics in Bloom," April 1988.)

Although we've covered a lot of ground, we've only touched on the technicalities behind the Mac II's color capabilities. Its other talents include the ability to substitute a similar color when the one you want isn't in the current look-up table, and to keep track of multiple palettes and screens. This latter skill becomes vital when you have both a color and a monochrome monitor attached to a Mac II. In such cases, the Mac II must keep track of each monitor's color capabilities and adjust its displays accordingly—even when you position a window so that it spans a color screen and a monochrome one (see "Looking through the Mac II Kaleidoscope," *Macworld*, December 1987, and "Chasing Rainbows," *Macworld*, July 1987).

Pick a Color, Any Color

Another example of Apple's attention to color details is the method it provides for choosing and changing on-screen colors. Rather than allow application developers to design their own color-choosing schemes—which could result in dozens of different approaches—Apple incorporated into the Mac's system a standard way of changing colors called the *Color Wheel* dialog box, a method similar to those of the familiar Open and Save dialog boxes.

The Color Wheel dialog box consists of a colorful circle with a scroll bar alongside it and six text-entry boxes filled with numbers (see "Wheel of Color"). The easiest way to choose colors is to drag the mouse pointer within the wheel; as you do, the numbers on the left side of the dialog box change to reflect the internal recipe for the current color. To decrease a color's brightness, you use the scroll bar. You can also type values directly into the text-entry boxes; one reason for doing so would be to



Wheel of Color

The *Color Wheel* lets you choose colors by dragging the pointer within the wheel or by typing values in the text-entry boxes. The color swatch compares the current color to the original. Programs that support customized palettes use the *Color Wheel* to re-define colors.

precisely duplicate someone else's color choices.

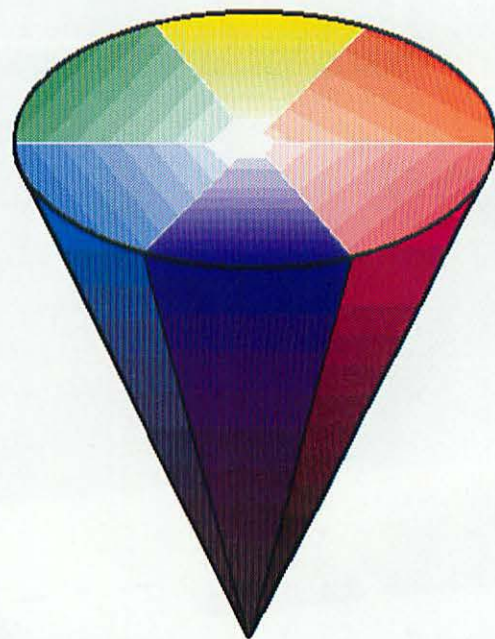
The text boxes reflect the current color or setting in two different ways, each corresponding to a different *model* for describing colors. In the *RGB* model, a color is described by the amount of red, green, and blue light it contains. In the *hue, saturation, and brightness* model, a color is described by its hue (its color, formed by a single primary color or a combination of primaries), its saturation (its purity, or the degree of gray present in the color), and its brightness (the degree of lightness from white to black). The models are interrelated; change a number in one set of boxes, and one or more values in the other set will change accordingly.

Understanding the hue, saturation, and brightness approach to color creation is easier if you pretend that the color wheel is cone-shaped, as in "Color Cone." The outer rim of the cone contains vivid, fully saturated colors. As brightness decreases, the cone gets narrower, since there are fewer discernable dark colors than there are bright ones. The cone's center axis always contains equal amounts of red, green, and blue, so it represents shades of gray ranging from white at the top of the cone to black at the bottom.

The color wheel, then, is simply a two-dimensional view of a three-dimensional (hue, saturation, and brightness) cone—it's as if you're looking at the cone from above. The wheel depicts the current color's hue and saturation, while the scroll bar to the right of the wheel represents the third dimension—brightness.

A Splash of Color

Enough of theory. What's it like to use a color Mac? In many ways, it's no different from using a monochrome one. Apple did a superb job of providing remarkable color features while retaining the Mac's easy-to-



Color Cone

Picturing the color wheel as a three-dimensional cone helps illustrate the concepts of *hue* (color), *saturation* (purity, or lack of dilution with white), and *brightness* or *value* (lack of dilution with black). The cone's outer rim shows fully saturated colors; as you move away from the rim, saturation decreases until you reach the center axis, which shows a complete absence of the original colors. As brightness decreases, the cone progresses from varying amounts of white at the top, through levels of gray, to black at the point.

use operating style. And it showed restraint in not using color for color's sake.

When the Finder first appears, don't expect to be dazzled. The Apple menu appears in color and a Color menu appears in the menu bar, but those are the only giveaways that you're using a color Mac. You'll find no colored menu bar or desktop pattern, no colored windows or scroll bars, no patches of brown rust on the trash can. Since color is such a powerful and highly subjective conveyer of information, Apple didn't want to overwhelm users with a rainbow of colors just because the Mac II can display them.

But it did provide some options for colorizing the Mac environment. The Control Panel's desktop pattern area lets you create colored desktop backgrounds. The Control Panel also offers an extension, or Control Panel device (cdev), named Color that lets you choose a different highlight color—the color used to indicate a selected icon or text passage. (For background on the modular Control Panel and its extensions, see "Getting Started with the New Mac System," *Macworld*, January 1988.) Finally, the Finder's Color menu offers another way to organize your files, by letting you assign any of eight colors to icons and folders. Then you can use the By Color command in the View menu to sort a disk's window according to the colors of its icons.

Colored desktops and icons are nice, but if you've just spent several thousand dollars on a Mac II and a color monitor, you might wish there were more ways to work color into your electronic desktop. There are, thanks to Kolor (a shareware cdev by Russ Wetmore) and Colorizer (by Palomar Software).

Colorizer includes a cdev called Colors that lets you add color to every element of the Mac's user interface, from windows and menus to scroll bars and buttons. It also offers many preset color combinations—like "Miami Vice," which turns your Mac into a palace of pastels, or "4th of July," which gives you a red, white, and blue workspace. Should you not share color preferences with Don Johnson or Ollie North, you can choose from over a dozen others or create your own. In addition, Colorizer not only lets you install color start-up screens, but it offers as well an application for adding color to MacDraw or any other PICT-format drawings and a screen-capture F-key that lets you commit full-

color screen shots to disk. At \$49, it's a package no Mac II owner should be without.

A Rainbow of Applications

Of course, you don't buy a color Mac just to have colored menus and scroll bars. Color adds a whole new dimension to electronic canvases and drafting tables, as well as to business and presentation graphics. (For an introduction to the color paint programs PixelPaint and Modern Artist, see "Live and in Color," February 1988.) Some programs can generate brilliant color slides by "printing" to specialized (and expensive) output devices called *film recorders* (see "Get to the Point," April 1988, for more on presentation graphics). Future products will let you specify colors using the Pantone Matching System (PMS), a standard method of color specification in the printing industry.

You'll also find color where you wouldn't expect it. Microsoft Excel version 1.5 allows color spreadsheets, and Ashton-Tate's dBase Mac database manager can display fields and records in color, too.

Equipped with a *gen-lock* expansion board, a Mac II can even send video signals directly into video equipment. The future is likely to see Mac IIs alongside million-dollar "paint boxes," creating on-air graphics and animation.

Color Me Compatible—Mostly

You might expect to find a raft of graphic incompatibilities between the Mac II and monochrome Macs, but there are surprisingly few. Color QuickDraw, which

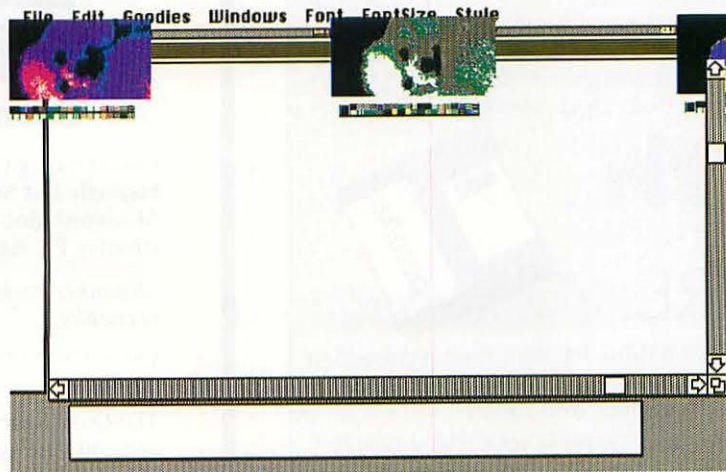
consists of the fundamental software routines responsible for the Mac II's color capabilities, works together with the latest version of the system files to keep the entire Macintosh family on good terms, graphically.

You can open a Color QuickDraw image on a monochrome Mac with System 4.1 or higher (previous versions would crash), but any color information that the original QuickDraw can't recognize will be discarded. On screen, whites will appear as white, but all other colors will look black. Because the original QuickDraw recognizes only 8 different hues—black, white, red, green, blue, yellow, magenta, and cyan—printing a glorious 256-color image from a Plus or an SE will yield only those 8 colors.

Of course, if you don't plan to move documents between Mac IIs and monochrome Macs, you won't run into this problem; if you're using a network and routinely shuttle documents between machines, though, beware. (Incidentally, for those SE owners anxious to enter the Mac color world, Orchid Technology now offers a 16-color display board for the SE called the ColorVue-SE for \$695, but a color monitor is also required.)

A slightly less troublesome glitch arises when you run some older Mac applications on a Mac II that's set up to display more than two colors: you're greeted by strange multiple images (see "Problem Palettes"). That's because the application's developer, rather than use the Mac's Toolbox

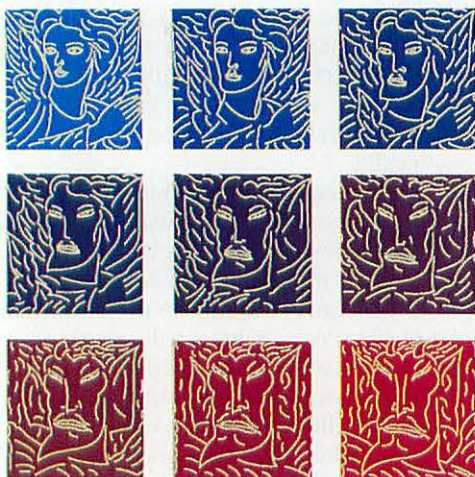
(continues)



Problem Palettes

The multiple images in this FullPaint display are caused by the application's mistaken assumption that it's running on a 1-bit-per-pixel Mac rather than a Mac II set for multiple bits per pixel. You can fix the problem by switching the Control Panel's Monitors extension to 2 Colors.

How To/Getting Started



Flexible Faces

These faces drawn in Adobe Illustrator 88 make use of the program's blending tool, which allows gradations in shape, line, or color.

routines, chose to violate Apple's programming guidelines by accessing the Mac's video memory directly—all for the sake of faster performance. Older applications that commit this sin assume they're running on a monochrome Mac, which uses only one

bit per pixel. When these applications fiddle with the Mac II's video memory, they access multiple bits per pixel, and therefore draw a separate small image for each bit. This problem surfaces with two popular graphics programs, FullPaint version 1.1 and SuperPaint version 1.0.

The solution is to use the Control Panel's Monitors extension to switch to two colors. That's an easy fix, but it can be inconvenient if you use MultiFinder, since it prevents you from simultaneously running other applications that require a more colorful Monitors setting.

Upping the Color Ante

Other gray areas exist in the world of Macintosh color. One problem is a dearth of color printers, especially ones capable of doing justice to the Mac II's talents. Selling for \$1395, Hewlett-Packard's 180-dots-per-inch (dpi) PaintJet looks promising, as does Shinko's 200-dpi thermal printer (\$4500). Some 300-dpi printers should be available this year, but expect their prices to be in the five-figure ballpark.

The high cost of color surfaces everywhere you look. An AppleColor monitor plus a fully expanded Mac II video board will set you back nearly \$2000. Neither is

very useful without a Mac II, so tack on an extra \$3800 just for a basic floppy-disk system. (If you plan to create full-page color images, add at least \$650 for a hard disk.)

So just because you're buying a Mac II, don't think you have to include a color monitor and a fully expanded video board. Color displays are beautiful, but they don't render text as sharply as monochrome ones do. And the extra processing time required to work with 256 simultaneous colors slows the Mac II's performance. Speed and expandability are far better reasons to buy Apple's newest Mac.

Of course, take my advice with a grain of salt. I took the Mac II color path—monitor and video board—even though I spend most of my time gazing at text. Why didn't I go the less-expensive monochrome route? Well, the excuse I gave my accountant—and she knows who she is—was that I need a color system to test and write about color software.

That's what you really need to buy a color Mac—a good excuse. □

See *Where to Buy* for contact information.

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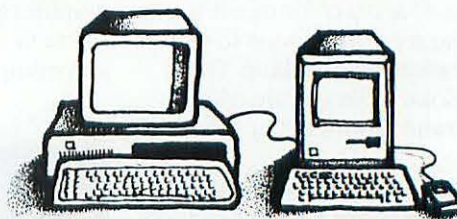
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Insights on WriteNow

Tips and techniques for better word processing

by Robert C. Eckhardt

MacWrite and Microsoft Word devotees may be surprised to learn that WriteNow currently rates as the second or third most popular Macintosh word processor (depending on your source). While not as powerful as Word 3.01, WriteNow is easier to use. And it contains many improvements over MacWrite 4.5: greater speed, a spelling checker, better line-spacing control, better graphics handling, and so on.

For WriteNow owners who have yet to learn all the fine points of their word processor, here are some tips that should make WriteNow a little more useful. Even those who consider themselves WriteNow experts will, I hope, find a few new and handy techniques in the following pages.

My thanks to Julie Wilson and Andy Jeffrey at T/Maker, Bob Bowen of the University of Washington School of Business, and Marcel Mendoza and Alan Harper for help in putting this collection together.

Upgrade to Version 2.00

By the end of spring 1988, WriteNow 2.00 probably will have been released. According to its manufacturer, T/Maker, this new version will answer many of WriteNow's critics by adding decimal tabs, a Window menu, built-in export and import file conversions, and cursor-key support, among other things.

If you neglected to return your registration card, or have yet to hear from T/Maker about the upgrade, call the company at 415/962-0195.

Except where noted, all of the tips that follow apply to both WriteNow 2.00 and its predecessor, version 1.07.

Memory Miser

If you have yet to upgrade your Macintosh to 2 megabytes or more of RAM, you



MICHAEL L. ABRAMSON

Larry Moran, a training coordinator with the Chicago Transit Authority, uses WriteNow on his Mac at home to develop CTA proposals, training materials, and the standard operating procedures that help the system run safely.

can take advantage of MultiFinder to run two applications at once if one is WriteNow (and the other is not a memory hog). Version 1.07 of WriteNow can fit inside a 128K partition of MultiFinder, although I would not recommend squeezing the spelling checker into such cramped quarters. At press time it was not clear if version 2.00 would fit in 128K, but according to T/Maker it will certainly fit in a 256K partition. For both versions, the recommended minimum partition when you want to include the spelling checker is 256K.

Document Conversions

WriteNow 1.07 owners complain about the program's inability to open or save files in text-only, MacWrite, or Microsoft Word format. If you are still using WriteNow 1.07, there are ways to minimize this inconvenience. Try beginning your WriteNow work session by launching WriteNow's Translator program and converting all the non-WriteNow documents you'll need, en masse. Then use Translator's Transfer To WriteNow command to go directly to WriteNow.

For those who would rather convert documents as they work, there's the share-

ware TranslatorDA by Edward L. Bolson, which lets you convert a text-only document to WriteNow format, or a WriteNow document to text-only or MacWrite 4.5 format.

Finally, for text-only documents, you don't need to use Translator or TranslatorDA. When running under MultiFinder, all you need to do is launch another word processor or text editor, open the document, copy the contents of the document to the Clipboard, switch back to WriteNow, and then paste the Clipboard contents into a new WriteNow document. Keep in mind, however, that you lose all formatting and graphics during a transfer such as this.

(continues)

Robert C. Eckhardt is a contributing editor and the author of Free (and Almost Free) Software for the Macintosh (Crown Publishers, 1987) and The Fully Powered Macintosh (Brady Books, 1988).

Counting Words

Tired of having to estimate the word count of your documents, or of using your stand-alone spelling checker to do the job? Well, there's an easier way. It's MultiCounter, a shareware desk accessory by Andrew E. Page. The program displays the number of characters, words, and sentences, and the average number of words per sentence. To get an accurate count of any document currently displayed on the screen, be sure to save it immediately before counting.

Checking Spelling from Memory

If you can't make room for WriteNow's dictionary file on either your start-up or application disk, use the Load Dictionary button in the Check Spelling window to load the dictionary from another disk. If you might check for misspellings again later, don't close the Check Spelling window when you are done. By keeping the Check Spelling window open, the dictionary remains in memory so you don't have to load it again for subsequent spelling checks. Just move the Check Spelling window down to uncover the ruler, bring your document window(s) to the front, and continue working. Also, be sure to keep at least one document window open at all times—closing all documents automatically closes the Check Spelling window.

Quick Dictionary Updates

To efficiently customize WriteNow's dictionary, select a block of correctly spelled text and then click on the Check Spelling window's Learn button. The dictionary then adds all the selected words it doesn't already know. Watch out that you don't add misspelled words by using this technique carelessly. You can Forget in bulk too, but be careful not to delete common words such as *and* or *the*.

Creating a Custom Dictionary

If your writing uses a highly specialized vocabulary, such as medical or legal jargon, or if you need a foreign dictionary to check letters to your European business partners, you can create your own custom dictionaries from scratch. To do so you'll need the Empty Dictionary file (available from CompuServe and elsewhere), a file in WriteNow dictionary format but devoid of any entries. Use the bulk additions tech-

nique to get the dictionary started, then add other words one by one as they come up—it doesn't take long to create a dictionary of the words you use regularly. Change the name of the file to French Dictionary or Legal Dictionary and load it with the Load Dictionary button in the Check Spelling window when you need it. Or, if you want to use this new dictionary all the time, name it Dictionary and then substitute it for WriteNow's dictionary file on your start-up or application disk.

Page Wrap Factor?

If you've ever attempted to comprehend the Page Wrap Factor explanation in the WriteNow manual, you'll know that it's a futile exercise. But even if you have no idea how it works, the Page Wrap Factor has at least one practical use. It determines the space between body text and headers and footers. If, after deleting the empty lines in a header, the body text and header remain too far apart, open the Page Setup dialog box and enter a smaller number for the Page Wrap Factor. Reducing the Page Wrap Factor by 9 points eliminates $\frac{1}{8}$ inch of space. Of course, increase the number if you want more space.

Search-and-Replace with Formatting

The Find/Replace command normally inserts your substitute text in the same font, size, and style as the text it replaces. Here's a way to replace with a different font or style—for example, to insert Symbol font characters into Palatino text. Type the characters you want to insert in the correct font, size, and style. Select them and copy them to the Clipboard. Select the Find command, enter the characters to be replaced in the Find Text box, and then click on the document window to send the Find window to the back—do not close the Find window. Now press ⌘-F . Once the item is found and highlighted, press ⌘-V to replace it with the contents of the Clipboard. Press ⌘-F again to locate the next occurrence, and repeat.

Aligning PICT Graphics

If MacDraw-format (PICT) graphics containing both text and graphics misalign when they print in WriteNow documents, the culprit may be the Use Printer Spacing option. Try opening the Page Setup dialog box and toggling Use Printer Spacing.

1. Select the first word of the type style that you want to change.

Stephen Dedalus as **Telemachus**
 Leopold Bloom as **Ulysses**
 Mrs. Bloom as **Penelope**
 Blazes Boylan as **Antinous** (The Leading Suitor)

2. Extend selection, hold down Shift key, and switch type styles.

Stephen Dedalus as *Telemachus*
 Leopold Bloom as *Ulysses*
 Mrs. Bloom as *Penelope*
 Blazes Boylan as *Antinous* (The Leading Suitor)

3. Voilà. Only the bold words have changed to italic.

Stephen Dedalus as *Telemachus*
 Leopold Bloom as *Ulysses*
 Mrs. Bloom as *Penelope*
 Blazes Boylan as *Antinous* (The Leading Suitor)

Shift-Change Sequence

Shifting is the key to global changes in WriteNow. Follow the instructions in the figure to change all words in the same type style. To change all rulers with identical settings, hold down the Shift key while changing one of the rulers.

Shifty Global Changes

WriteNow includes a powerful but somewhat arcane way of changing all text that shares the same font, size, or style, or all rulers with matching settings. I call it the Shift-change technique because you make these global modifications by pressing the Shift key as you make a change. For example, to change all bold italic text to plain italic, select the first bold italic word in a document and then extend the selection to the end of the document (scroll to the end, press Shift, and then click). Press the Shift key as you select the Bold command to toggle off the boldface and make the words italic (see "Shift-Change Sequence").

Stylesheets, Almost

Although WriteNow doesn't have stylesheets, you can create a homemade equivalent with ruler documents. Before working on a complex document, decide how you want it to be formatted. Then create a series of ruler documents, each containing only a single ruler formatted for an element

(continues)

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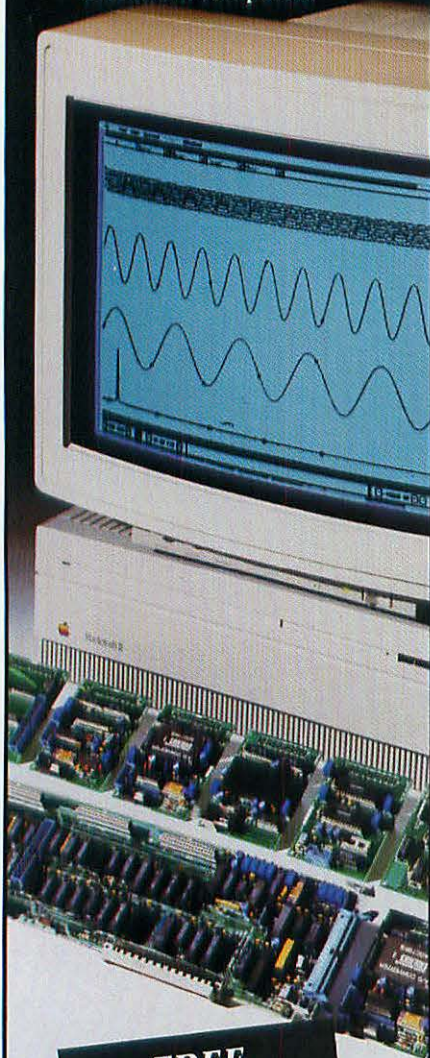


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How To/Insights

in your writing document—one for a standard paragraph, one for a section head, one for an equation, one for a bibliographic entry, and so on. Name each document accordingly and keep them all open. Then start writing; any time you need a different format, instead of changing the ruler by hand, go to the appropriate ruler document. In version 1.07, you can cycle through open windows by pressing \mathbb{H} - = repeatedly; in version 2.00, you can also select the appropriate document from the Window menu. Copy the desired ruler by pressing \mathbb{H} -1, return to the writing document (again using \mathbb{H} - = or the Window menu), and paste the ruler using \mathbb{H} -2.

If your writing document contains different types of paragraphs with the same ruler format (such as section heads and subheads that differ only in font size), create unique ruler documents for them anyway. For example, put a tab way out in the right margin—where it doesn't affect formatting—in a different position on each ruler. With unique rulers for each format, you can use the Shift-change technique to change all the rulers for a specific element throughout a document—for example, to switch all second-level headings from flush left to centered.

Adjustable Paragraph Spacing

In a similar vein, create a ruler for the space between paragraphs to make adjusting interparagraph spacing easy. To do so, select the Return character (visible when Show Space is turned on) after the first paragraph of your document, bring up the ruler, format it in some way to distinguish it from other rulers, and set the between-paragraph spacing. Copy the ruler to the Clipboard; also store it in a ruler document for safekeeping. As you write, paste the ruler from the Clipboard after each paragraph as you go. This adds tedium to the writing process; though it might be impractical for those who edit as they write, should you need to change interparagraph spacing from, say, 6 to 20 points throughout the document to make it fit your format, you can do so easily using the Shift-change technique.

Switching Printers without Unwanted Changes

If you switch between ImageWriter and LaserWriter, be sure to select the Tall Adjusted option in the ImageWriter Page Setup dialog box before you proof page breaks and other final copy details. If you do not, formatting may change as you switch from one printer to the other, and thus may require some work to get it back in line. Under Tall Adjusted, most formatting details such as page breaks, line breaks, and margins remain constant for both ImageWriter and LaserWriter.

Stationery Shortcuts

A handy but often neglected feature of WriteNow is the Stationery document. If you create a file with the margins, font, font size, leading, and other formatting you prefer and save it under the name Stationery, all new documents open with those settings. There's only one glitch in the Stationery technique: if you subsequently change fonts in the System file, WriteNow alerts you to that fact every time you open a new document. To silence this annoying message, open the Stationery document (with the Open command, not the New command), save it, and close it.

In WriteNow 2.00, if you want to bypass the Stationery file and open a new document in standard WriteNow format, hold down the Option key when you select the New command from the File menu, or when you launch WriteNow.

Avoiding Unprintables

In addition to displaying spaces, tabs, returns, page breaks, and other nonprinting characters, the Show Space command can determine in advance if parts of a document extend beyond the area of the page that the printer can print on. Be sure the type of printer you intend to use is selected in the Chooser and displayed in the Page Setup dialog box. Select Show Space from the View menu and move both scroll bars to see if any part of the document extends beyond the dotted rectangle that frames the printing area of the page (see "Stay in the Printing Area"). To keep everything within the printing area, use binding or ruler margins to pull text in from the sides and adjust headers and footers to add more blank space at the top and bottom of the page.

(continues)

How to Buy the Right Monitor.

Let's cut through the hype and misinformation about large-screen monitors for desktop publishing. At Moniterm, we developed the first large-screen monochrome monitors. And based on 9 years of OEM experience, we've now built a family of large-screen, hi-res monitors for every application.

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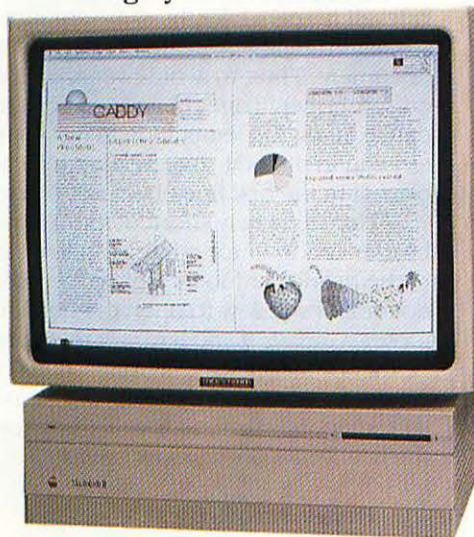
Page-size portrait monitors are great for word processing, but impractical for desktop publishing. To avoid constant zooming and scrolling, we recommend a 19-inch landscape monitor, like our Viking 1 for the Mac SE and Mac II. Professionals who want to view two full-size facing pages will need an even larger monitor—our new 24-inch Viking 2400—Moniterm's largest monochrome monitor.

What resolution is required?

Optimum publishing resolution for 19-inch or larger monitors is 1280x960 pixels, featured on our Viking 1 and Viking 2400 monitors. At less than 72 dpi (dots per inch), fine print becomes too hard to read. Resolutions more than 95 dpi also make characters hard to read and unfocused. And screen updates are painfully slow.

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Viking 2400 24" monitor.

differentiating objects on the screen. It features 256 shades of gray for near-photorealistic images. And, you'll benefit from sharper text and lower cost.



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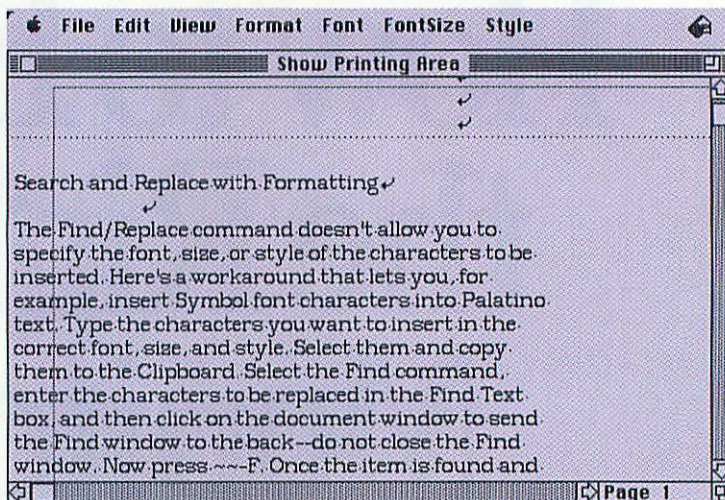
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How To/Insights



Stay in the Printing Area

Selecting Show Space from the View menu lets you know if your text overflows the image area for your printer, indicated by the dotted rectangle. Here, the text goes too far to the left; we need to move the left text margin in to keep the words within the printing area.

Headers and Footers

Headers and footers in WriteNow follow the greatest common denominator rule: all of them take the same amount of space as the largest header or footer in the document. Thus, to avoid oversized headers on subsequent pages of your correspondence, resist the temptation to put your letterhead in the first page header. Instead, place it in the first line of your document.

Here's an easy shortcut for opening a header or footer for editing: double-click in the header or footer area of the main document window to open the header/footer window. If you have yet to create a header or footer window, version 1.07 tells you to do so. Version 2.00, however, asks if you want one created for you. Click Yes and the header/footer window opens.

Faster Scrolling

You can speed up scrolling in illustration-laden documents in version 2.00 by selecting the Hide Pictures command. The pictures will print as usual, but on the screen WriteNow displays a gray box in place of each graphic. Each box adopts the size of the picture it replaces, so line breaks and page breaks don't alter.

Outlining with Acta

Probably the most convenient outliner to use in conjunction with WriteNow is the desk accessory Acta 2.0. This new version of the DA contains a WriteNow translator that saves Acta outlines, complete with outline numbering and indentation, in standard WriteNow file format. As a result, reformatting an outline back in WriteNow is easy. Since each outline level has a

unique ruler, you can make document-wide changes to the ruler settings for individual heading levels using the Shift-change technique.

Adding Equations

WriteNow lacks the mathematical typesetting capabilities of Microsoft Word, but you can easily add sophisticated math typesetting to WriteNow by using an equation editor such as The Expressionist or MathWriter. Equations created in editors such as these are simply imported into WriteNow via the Clipboard and pasted into your document.

If the equation is embedded in a line of text, you may need to lower the equation so that it more or less aligns with the text on either side. To do so, select the equation, then select Subscript from the Style menu (or press \mathbb{S} -L) a few times to bring the equation into line.

A long equation or a display equation goes on a line of its own. Set the position of left-aligned equations with the left margin on the equation ruler. To center an equation, place a tab in front of the equation and set a centered tab on the ruler. Use a right tab at the right margin to position the equation number. Finally, select the equation and subscript it till it aligns with the equation number in the right margin. □

See *Where to Buy* for contact information.



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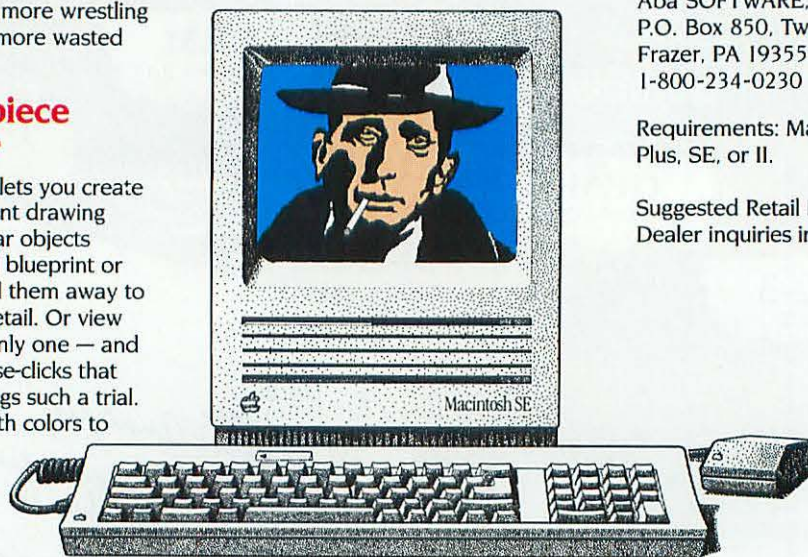
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Circle 212 on reader service card

Mac Hard Disk Tools

A roundup of utility programs that make a hard disk work harder

by Bangs L. Tapscott

As hard disks decrease in price and software increases in K-count, more Macintosh owners find the wide open spaces of a hard disk irresistible. After you graduate from floppies to a hard disk, though, it takes only a little while for the disk to start looking like Fibber McGee's closet. And searching a crowded disk for a desperately needed file may seem like a job for Indiana Jones.

The hierarchical file system (HFS) used on all SCSI hard disks contributes to the problem. By nesting folders within folders, HFS makes it possible for the Mac to keep track of hundreds or thousands of files on a single disk. But the HFS structure makes it easy to lose files, and hard to get at the ones that are not lost. You innocently drag a file onto the desktop, drop it in just the wrong place, and *zap*—some unidentified folder swallows it. Or it's time to balance your checkbook file, and you have to burrow through five nested folders on the desktop just to open it.

Fortunately, software publishers have come to the rescue with utilities that help hard disk users to keep track of files and to use hard disks efficiently. The most important of these are the catalogers, locators, smoothers, launchers, and Finder substitutes. (Backup programs were covered in "Data Savers," *Macworld*, February 1988.)

What's on the Disk?

A cataloger tells you what is on a disk. More sophisticated ones produce files that users can save to disk, print, or manipulate on screen; such catalogers let users control the appearance and contents of a catalog.

Bangs L. Tapscott, professor of philosophy at the University of Utah, has written several books and articles on mathematical logic. He's a founding officer of the Utah Macintosh Users Group.



Look for *filtering*, which lets you select categories of files to exclude or include—for example, all Microsoft Word documents. Another desirable feature is the ability to save the catalog in a form you can import to databases or spreadsheets.

Beware of the limitations of incomplete path names. In HFS jargon, a *path* is a description of the folders-in-folders location of the item; to find a particular file, you need the complete list of the nested folders that lead to the desired file. Catalogers that

display in columnar format, as most of them do, may truncate long path names (see "Catalogers").

I tested the catalogers on a hard disk containing 15 megabytes of data, consisting of a little over a thousand files and about two hundred nested folders. Special thanks go to Fred Swan of Cutting Edge for help in preparing a test disk.

Disk Ranger is my personal favorite, by a narrow margin. It's the fastest of all the catalogers I tested, and it will catalog any hard disk or collection of floppies. The col-

(continues)

Catalogers

	Disk Ranger	DiskQuick	Cat Mac	FileTree	HFS Dir
Cataloging time ¹	1 min., 15 sec.	4 min., 37 sec.	1 min., 18 sec.	5 min., 44 sec.	1 min., 47 sec.
Display	columnar	indented	columnar	columnar ²	indented ²
Amount of catalog detail ³	***	***	**	****	**
Filtration ³	***	**	***	none	none
Saves as	catalog; text	catalog; text separated by tabs or commas	catalog; text separated by tabs or commas	text	text

¹ Tested on a volume with 15MB in about 1000 files nested in about 200 folders.

² Creates text file that must be opened with a word processor.

³ Relative amounts rated on a scale from one to four.

umnar display can be sorted alphabetically by file name, volume, type, or creator. Disk Ranger allows exclude-filtering on 14 pre-set file types, plus a wild-card type specified by the user. A Find feature locates any item in the catalog by partial file name: type in a string, and the program locates each file whose name contains that string. And Disk Ranger has the best floppy-disk labeling facility of the catalogers I tested.

DiskQuick, a commercial release of the shareware program Disk Librarian, is a powerful program with an elegant interface. DiskQuick takes more time to catalog a disk than Disk Ranger does, but it collects more data, including comments from Get Info boxes (in version 2.10 this feature

doesn't work when MultiFinder is running). The good-looking noncolumnar format shows all information fields without truncation. When you scroll the catalog window, it keeps the name of the current volume as the top line until the contents have scrolled past—a classy touch. The find option searches for partial file names.

Cat Mac is shareware. An excellent cataloger, its detailed online help means there is no need for a printed manual. It supports filtering on ten different file properties, any or all of which may be user-specified. Columns may be shuffled within the catalog to suit your taste.

HFS Dir is a no-frills shareware program that creates catalogs as external text-

only files on disk: fire it up and it catalogs the current volume without asking questions. To read or modify those files, you need a word processor or text editor. Catalog files, in outline form, look especially nice when opened with a text editor, such as QUED, that contains built-in tabs. HFS Dir catalogs only the current volume— not multiple floppies.

FileTree is another no-frills shareware program that catalogs only the current volume. Like HFS Dir, it is a text-only catalog on disk, but it produces an amazing amount of file information, including the screen coordinates of the file's icon. Another slow but otherwise attractive program, MDC II, is out of production; a suc-

Locators and Smoothers

	Find File	HFS Locator Plus	Locare	DiskTop	DiskTools II	Findswell	HFS Navigator
Type	DA	DA	F-key	DA	DA	Init	Installed
Search time ¹	55 sec.	75 sec.	75 sec.	60 sec.	32 sec.	35 sec.	67 sec.
Search flexibility ²	*	**	***	***	**	*	*
Amount of path information ²	**	**	***	***	***	*	*
Launches files			●		●	● ³	●
Renames		●	●	●	●		●
Copies		●		●	●		
Moves		●		●	●		
Deletes			●	●	●		●
Shows Get Info comments		●	●				
Creates new folders				●	●		●

¹ Tested on a 20MB disk with about 18MB of data in 1100 files.

² Relative amounts on a scale from one to three.

³ Launches only files in the current application.

cessor, currently in the works, promises to be much faster.

Where Did I Put It?

A locator helps you find the file that was swallowed by the anonymous folder. Type in some text and the locator tells you where to find every file with that text in its name. When deciding which locator to buy, look for flexible search criteria: how precise do your instructions have to be? Will the locator accept a partial string from the middle of the file name? Can the search criterion be a creation or modification date or something else other than a name? Power is also important: what can you do once the item is found? Another consideration is

HFS Locator Plus is a powerful desk accessory locator, supporting searches for partial names and/or for files created or modified before or after a certain date. Once located, a file may be renamed, deleted, moved to a different location, copied, or launched. Besides the path, Locator shows type and creator, creation/modification dates, size, standard Finder attributes, and Get Info comments (which you can edit within HFS Locator Plus). It also allows the creation of new folders (in which to save the located files).

Locare is a shareware F-key by Raymond Lau, author of other excellent Mac utilities. An F-key is invoked by holding down the \mathbb{A} and Shift keys while hitting a

different branch, you need to follow a jagged path: back from the first branch to the trunk (that is, the Finder level of the file system), then into the other branch to the desired folder. A path-smoother avoids all that, by establishing a straight-line route between two folders no matter where they nest in the HFS tree.

Two smoothers, Findswell and HFS Navigator, do essentially the same thing but in different ways. Both modify the standard dialog box you see when you Save As or close a document and then choose Open from the File menu. They only come into play when you are already running an application or a desk accessory.

Findswell's simple installation procedure adds a new button in the corner of the dialog box (see "Faster Filing"). This button enables you to search for files or folders by name and save their names, once located, in a semipermanent list of files you refer to frequently. A click on a file name that is compatible with the current application (remember, you are already in an application when you run Findswell) opens that file.

I prefer HFS Navigator's simpler interface. With Navigator installed, clicking on the current folder name in the Open dialog box yields a Navigator menu of preselected folder names. Click one of them to go instantly to that folder (again, the window shows only files that the application currently running can read). Option-click on the folder name to see the normal HFS menu of folders instead; \mathbb{A} -click to locate a particular folder or file and rename or delete it. In Save As mode, you can create new folders.

On to the Next Thing

The standard procedure for going from one application to another is to quit, wait while the Finder (the desktop) comes up, look for the next application, and open it. A launcher avoids the wait by going directly from one application to the next.

HFS Locator launches files and documents, but only after they have been pinpointed through a search. Some Finder substitutes also have impressive launch capabilities. But there is one launcher worthy of separate mention.

Launcher FKey is a public domain program (that means *free*). It is simple and

Finder Substitutes

	DiskTools II	DiskTop	Oasis	PowerStation
Type	DA	DA	application	application
Launches applications	•	•	•	•
Launches documents	•	•	•	•
Renames	•	•	•	
Copies	•	•	•	
Moves	•	•	•	
Deletes	•	•	•	
Erases disk	•	•		
Creates new folders	•	•		

search time: how long does the program take to find a file?

It is difficult to compare search times for a specific file objectively, because different programs scan directories in different orders. The figures given in "Locators and Smoothers" show the time required to search the entire test volume (a 20MB hard disk containing about 18MB of data in 1100 files) and represent the amount of time it would take to locate a single file if it were the last one in the last directory.

The Find File desk accessory is included with Macintosh System software version 4.1 and later. It's not fast or powerful, but it works, and it's free. Find File searches only on the initial segment of a file name, and shows path name, creation/modification dates for the file, and size in bytes and kilobytes.

number key, useful when you are within a program that doesn't support desk accessories. Locare searches on partial names and will filter by file type, creator, or modification date. Locare shows the complete path, the size of the data and resource forks of the file, the creator and type, and creation/modification dates and times. It also shows and edits Get Info comments.

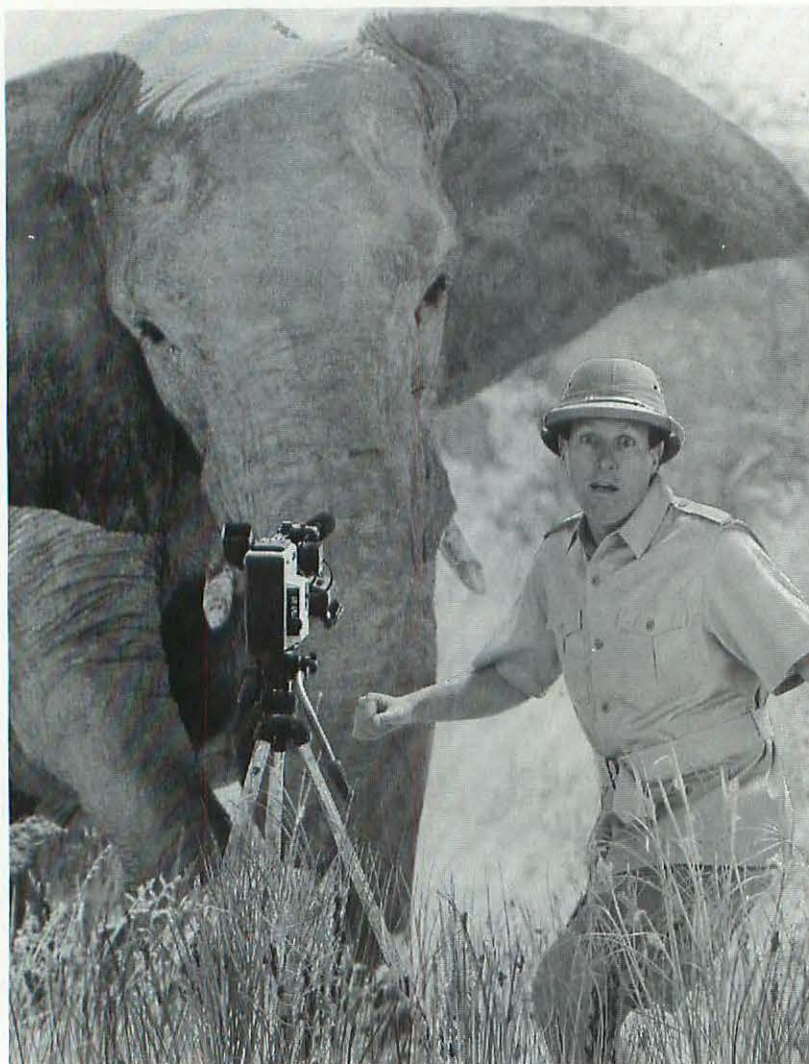
Two other excellent locator facilities are found in the Finder substitutes DiskTop and DiskTools II.

Save Me from HFS

To get from a folder concealed in a series of folders on one branch of the HFS tree hierarchy to another folder nested in a

(continues)

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Fred Molinari, President



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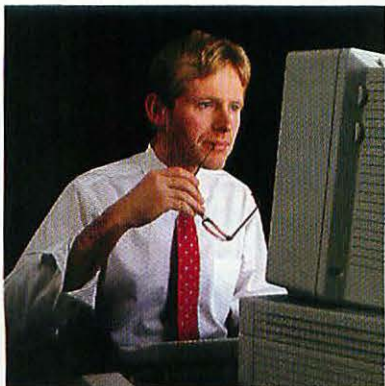
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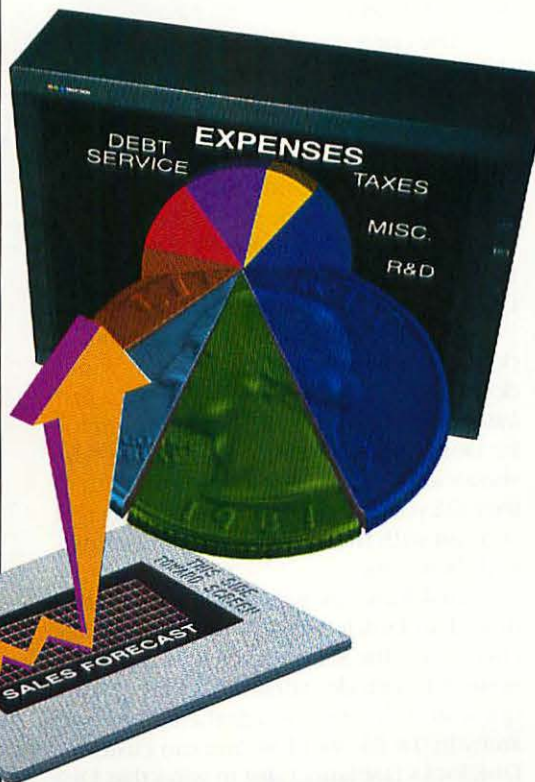
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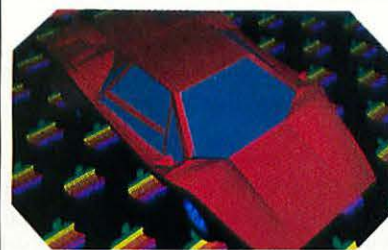
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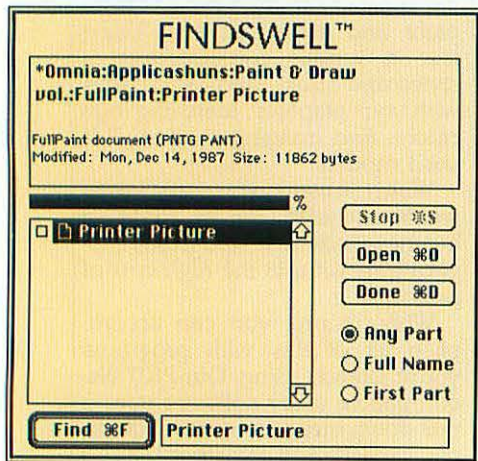
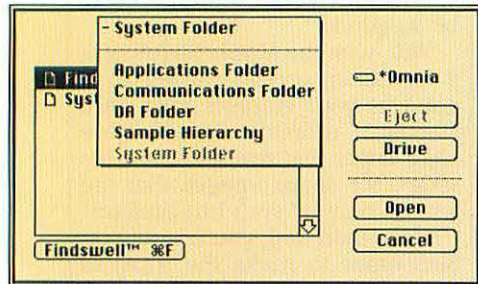
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error-free; I've been using it for over a year, and I've never seen the bomb message while using it. Invoke the F-key and nothing happens—except a beep—until you quit the current application. Then, instead of returning to the Finder, you get the standard Open dialog box. Move through folders until you find the application you want, select it, and you open the new application. Launcher FKey is especially handy when combined with HFS Navigator, which smooths the trek through folders to find the application you want.



Faster Filing

Here's how the Open dialog box looks with both Findswell and HFS Navigator installed. Navigator replaces the standard pop-up menu with its own menu, displaying folders of your choice. When you click the Findswell button, the illustrated box appears. You type the name of the file you want, the path description appears in the box at the top, and if you're in the right application, you double-click to open it.

Avoiding the Finder

The Finder is another Macintosh mixed blessing. Many users feel deep down that they're not really working on a Mac unless they can see the desktop with

all its icons and windows and other wonderful business. But creating that wonderful business on the screen consumes lots of computer processing time and power. With a hard disk and a really complicated desktop, the resource drain is even greater. Finder substitutes perform most Finder functions and more, without the luxurious desktop display (see "Finder Substitutes"). The four reviewed here are two sets of fraternal (similar, but not identical) twins: a pair of desk accessories, and a pair of applications. A new program appeared too late to include in my tests: MacTree displays folders in the form of a tree chart and from there lets you copy, move, delete, or rename anything on the disk.

DiskTop and DiskTools II are powerful and elegant desk accessories with so many essential features in common that it is difficult to rate either of them higher than the other. They differ mainly in embellishment and interface. DiskTop is mostly button and menu driven; DiskTools is mostly icon driven (see "Alternative Desktops"). First, their common features.

The contents of the hard disk are shown, folder by folder, in a window similar to the Finder's View by Name display. Files can be renamed, moved to a different folder or disk, copied, or deleted. You can create new folders and erase disks. A Find feature locates files by partial file name or creation/modification date. You can examine and modify file properties such as type, creator, and Finder attributes.

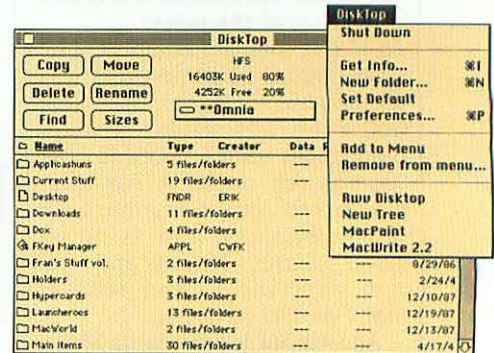
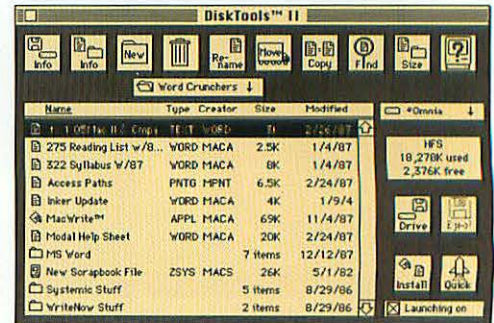
To launch either files or documents, double-click on them in the display window. Additionally, you can construct a *fast launch* list of files, which allows them to be launched at any time regardless of what shows in the file window. In short, with either DA you can do nearly everything that you can with the Finder (except printing) and then some.

DiskTools takes noticeably less search time than DiskTop. DiskTools' icons let you click to see the status of the Mac and the System and Finder versions, and they allow quick step-downs through the folder hierarchy in the file window. You can customize DiskTool's fast launch list in ways that DiskTop doesn't permit.

DiskTop's locator allows immediate launch of a file once it has been located. DiskTools' doesn't. Also, DiskTop allows you to attach comments to files, in addition to the regular Get Info comments. DiskTop comments are accessible only through DiskTop and do not get erased when the

Desktop file is rebuilt, as Get Info comments do. A problem in version 3.0 that caused DiskTop to bomb under Multi-Finder was corrected in version 3.02.

Since both DiskTop and DiskTools are DAs, all of their features are available while you are running an application, as well as when you are at the desktop.



Alternative Desktops

The two Finder substitutes DiskTools and DiskTop are similar in look and function, but DiskTools is almost entirely icon-driven while DiskTop relies on menus and buttons.

Oasis and PowerStation are Finder-substitute applications. Unlike the DAs, these Finder replacements provide an alternative home base to return to when quitting an application. Because they use a relatively fixed screen display, returning to them is much faster than redrawing the Finder's elaborate desktop.

I haven't noticed any significant difference in launch times between Oasis and PowerStation. Both come with screen savers that darken the Mac's screen during periods of inaction.

Oasis is shareware by Jan Eugenides. It holds up to a hundred buttons, if you need that many. In addition to launching applica-

(continues)

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How To/Mac Tools

tions and documents, Oasis lets you copy, rename, delete, and move files. A Transfer feature enables you to launch any application, not just those with buttons. It opens under MultiFinder but does not stay loaded after a document launches from MultiFinder.

PowerStation has a capacity of 432 buttons—more than enough to undo the good of a Finder substitute, if you get carried away. However, you can append a list of documents to a button for an application; you can then open those documents without chasing them down through the HFS tree. A fixed Other button lets you launch applications without buttons of their own. PowerStation lacks the file-manipulation options of Oasis but is fully operational under MultiFinder.

Both programs are extremely easy to use, and can speed up and simplify many of the tasks a hard disk owner does with the Mac. Your best bet, if you really want to avoid contact with the Finder, is to pair up one of the applications with one of the DAs: PowerStation with DiskTop, for example, or Oasis with DiskTools. These combos will do essentially everything the Finder does, plus more. Then make PowerStation or Oasis the start-up application (use Set Startup in the Finder's Special menu), and the only time you'll need to go to the Finder is when you want to look at the pretty pictures.

A Note on Shareware

I would like to say a little something on the subject of shareware, which is a marketing and distribution method rather than a kind of software. Shareware isn't sold in stores; instead it's passed from hand to hand. You copy it from someone and try it out. If you like it and use it, then you send the creator payment for it. Although shareware is widely pirated, it's *not* in the public domain, and it's *not* free. Shareware fees tend to be under \$30, belying the notion that software has to be expensive to be good. Many of the Macintosh's most widely used programs are, or started out as, shareware. Be sure to pay for the shareware you use. If you don't, you poison the well. □

See *Where to Buy* for contact information.

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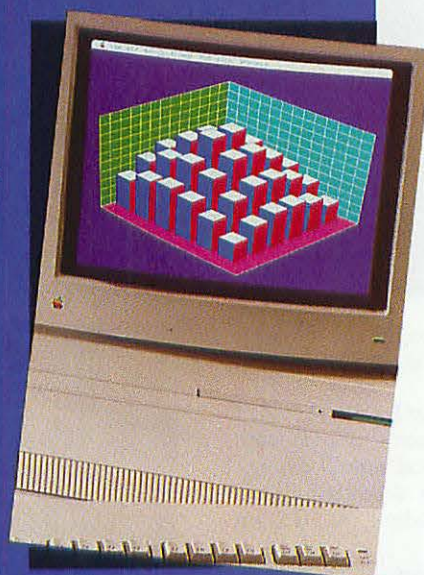
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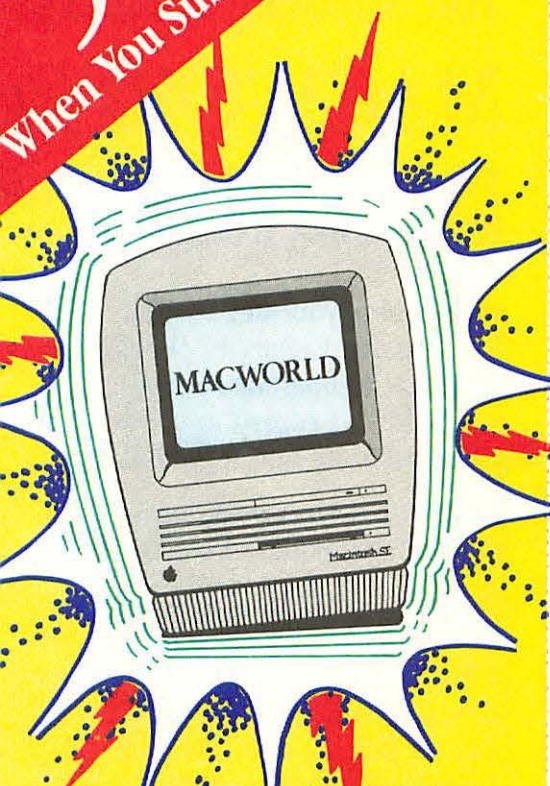
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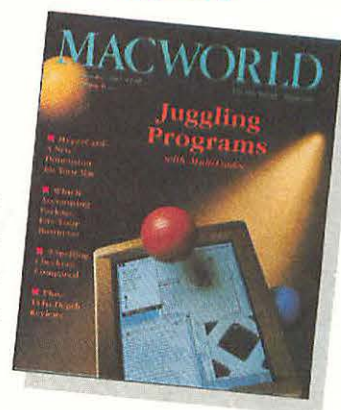
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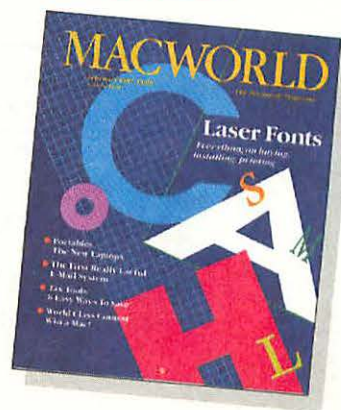
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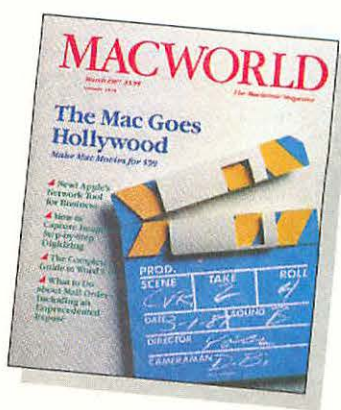
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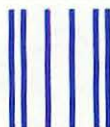
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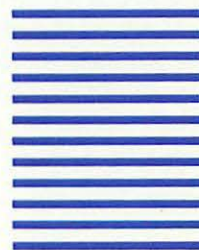
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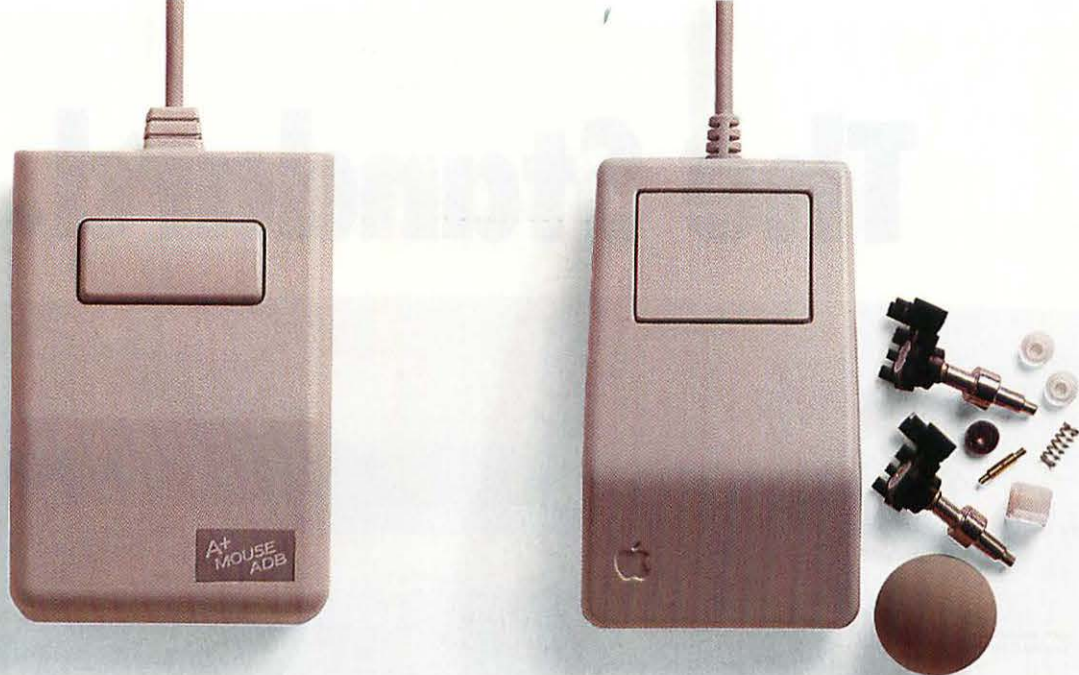
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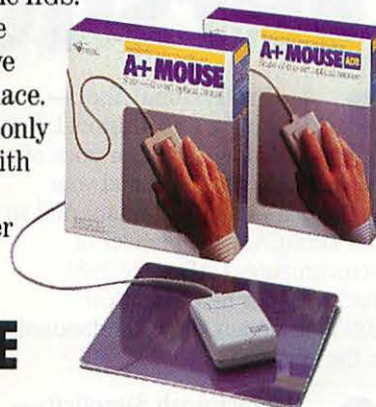
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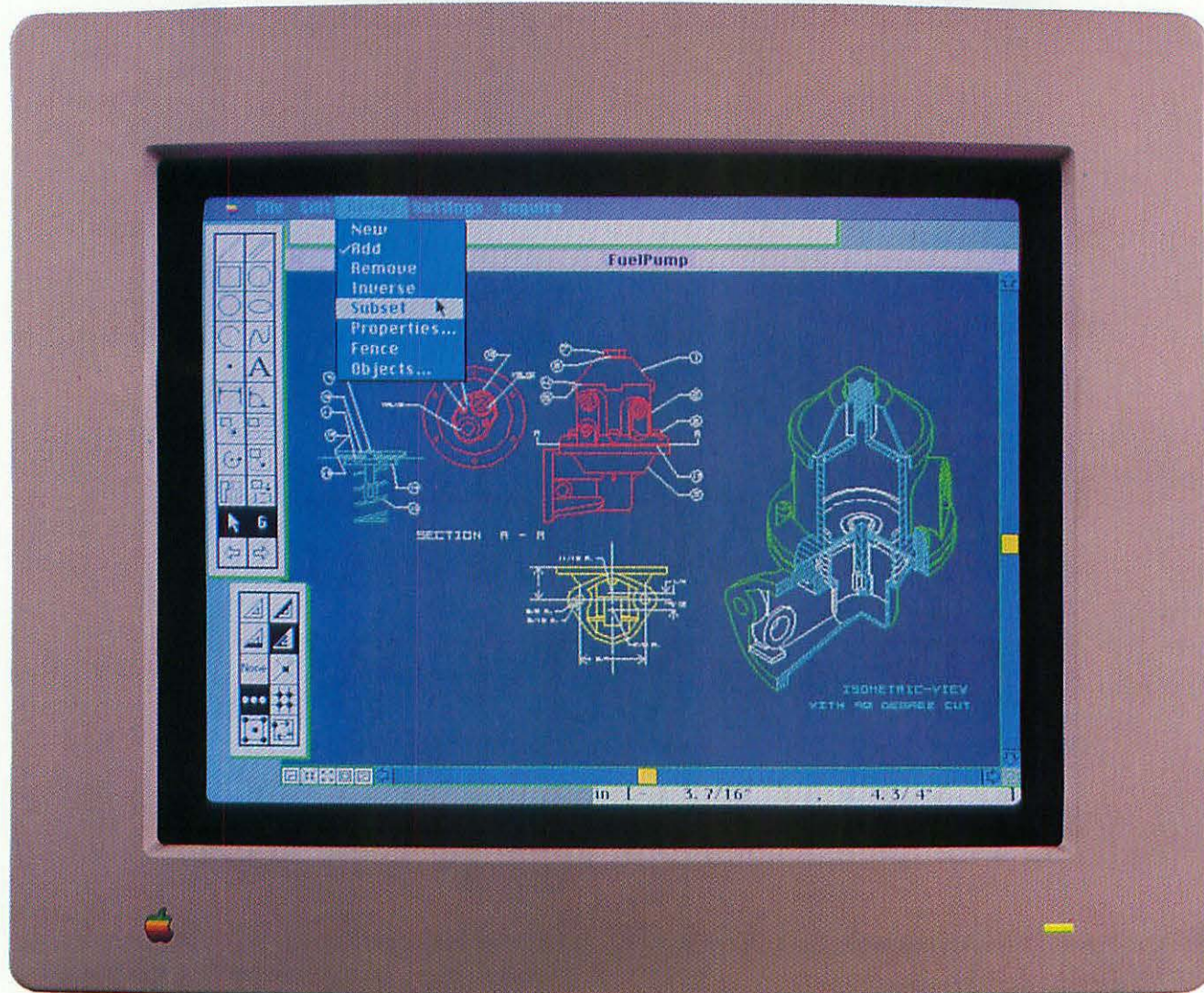
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Updates

This list brings you the highlights of software updates recently received. The first price is the upgrade cost for registered owners; the second is the current list price.

AEC Information Manager version 1.21 is faster. It provides increased graphics capability, contains more example files, and comes with new documentation. AEC Management Systems, 20524 Amethyst Ln., Germantown, MD 20874, 800/346-9413, 301/428-3694 in Maryland. Free; \$695 new.

Colorizer version 1.1 supports color menus and multiple color displays. This version can copy selected pixels of a color image to the Clipboard. Palomar Software, P.O. Box 2635, Vista, CA 92083, 619/727-3922. Free; \$49.95 new.

Cue version 2.0 adds the ability to synchronize clicks and sound effects to a film's SMPTE track through the use of the MIDI Time Code. Also lets you sync up to 40 MIDI event triggers that will be played at specified SMPTE locations when laying back sound effects to audio tape. The SMPTE lock allows input of cue points directly from video with a single keystroke when using Vertical Interval Time Code. Opcode Systems, 1024 Hamilton Court, Menlo Park, CA 94025, 415/321-8977. \$75; \$595 new.

DiskFit version 1.4 includes the DataStream Tape Driver, which allows you to back up any 3M DC 2000 tape unit. This version works in the background under Multi-

Finder and allows you to exclude folders from a backup. Mac II compatible. SuperMac Software, c/o Logistix, 1380 Piper Dr., Milpitas, CA 95035, 415/962-2477. \$20; \$99.95 new.

DiskTop version 3.0.2 is MultiFinder compatible and supports international systems. CE Software, 801 73rd St., Des Moines, IA 50312, 515/224-1995. Free; \$49.95 new.

Draw It Again, Sam version 2.0 enables bitmaps to be used with object-oriented graphics on the same layer. Aba Software, P.O. Box 850, Frazer, PA 19355, 800/234-0230, 215/644-3580. Free; \$150 new.

Front Desk version 6.0 includes multiuser capabilities. It can use up to 30 resources, is LaserWriter compatible, and has new report formats. Layered Inc., The Schrafft Center, 529 Main St., Boston, MA 02129, 617/242-7700. Single user \$49, multiuser \$69 per node; single or multiuser version \$99 per node new.

Great Plains Accounting Series version 4.2 follows Apple interface guidelines and adds new commands to the File menu. Option/⌘ lines are now buttons, a Pause/Continue/Cancel dialog box is available during printing, and ⌘-period(.) aborts reports. The main window may be up to 132 columns wide, and menu windows now have true arrow keys. Great Plains Software, 1701 S.W. 38th St., Fargo, ND 58103, 701/

281-0550. Free for Customer Assistance subscribers, otherwise \$50 per module; \$795 per module new.

Insight Expert Accounts Receivable, Accounts Payable, and General Ledger versions 2.0 fix bugs, print in draft mode, and are ImageWriter II and AppleShare compatible. Accounts Receivable (A/R) supports up to five decimal places for unit price, unit cost, tax rate, and quantities. It adds questions about decimal places and audit history to Business Set-up. The rounding procedure follows standard conventions. Batch Date has been added to the sales and cash receipts journal. The tax exempt field on the customer information card now allows 16 characters. Password security does not limit the number of users. Accounts Payable (A/P) prints an Expert Report. The company name field has been extended to 35 characters. Expense distribution report now uses a faster sorting method. All user-entered dates are checked for validity. A/P can print an entire ledger card; the Expert Report plots graphs. Multiuser A/R and A/P support up to 16 users on a file server or AppleShare-compatible network. Allows users to work on invoices, checks, and journals, then consolidate to one posting. Multiuser A/R prints custom labels. Layered Inc., The Schrafft Center, 529 Main St., Boston, MA 02129, 617/242-7700. Standard upgrade \$25 per module, multiuser upgrade \$295 per module; \$595 each new.

(continues)

Laser FX version 1.6 includes a built-in font downloader and a Laser-Writer status report. The menus have been rearranged for more efficient use. Postcraft International, 27811 Avenue Hopkins, #6, Valencia, CA 91355, 805/257-1797, 416/641-0768 in Canada. Free, with \$10 s/h; \$195 new.

Listen version 2.1 improves the user interface and incorporates a level-selection menu. New manual available. Resonate, P.O. Box 996, Menlo Park, CA 94026, 415/323-5022. \$34, unregistered users must also return the original disk; \$99 new.

MacCalc version 1.2c is compatible with MultiFinder. Bravo Technologies, P.O. Box 10078, Berkeley, CA 94709-0078, 415/841-8552. Free; \$139 new.

MacEqn version 2.1 features a symbol palette for customizing MacEqn, a command palette, limited programmable characters, programmable groups, new group characters, support for diacritical marks ("hats," tilde, dot, double dot), metric or English rulers, sizable window, vertical scrolling, sweep character selecting, help menu option, traditional form, and selection dragging. Supports direct printing from MacEqn. Software for Recognition Technologies, 55 Academy Dr., Rochester, NY 14623, 716/359-3024. Return original disk plus \$12; \$44.95 new.

MacFlow version 2.0 lets you specify flow-chart size up to 8 pages by 8 pages; adds custom drawing tools and ability to output PICT files. Mac II compatible. Revised documentation available. Mainstay, 5311-B Derry Ave., Agoura Hills, CA 91301, 818/991-6540. \$25; \$195 new.

MacLinkPlus version 2.0 includes Mac-to-Mac communications capabilities, new options such as WordPerfect and Microsoft Word in the library of document translators, and Apple File Exchange compatibility. DataViz Inc., 16 Winfield St., Norwalk, CT 06855, 203/866-4944. Free if purchased after Oct. 1, 1987, otherwise \$20; \$195 new.

MacNail version 1.5 provides multiple windows and single-column format; recalculates faster. This version adds four estimators for construction work: new construction, gut/rehab, additions, and small jobs/repairs. Also has a short form; able to track job costs on one or two levels of detail. Turtle Creek Software, 651 Halsey Valley Rd., Spencer, NY 14883, 607/589-6858. Free; \$195 new.

MacPaint version 2.0 features tear-off tool and pattern palettes, up to nine resizable document windows open at one time, a snapshot function for saving documents at various stages, and automatic document scrolling while using the drawing or selection tools. Enlarges to 200, 400, or 800 percent, or reduces to 50 percent, all with editing capability. Supports full-page displays as well as built-in Macintosh monitors. Adds ability to create custom start-up screens and ability to save document templates. Displays size and location of shapes as you draw them. Shapes can be drawn from the center outward or from corner to corner. Supports MultiFinder. Claris, 440 Clyde Ave., Mountain View, CA 94043, 415/960-1500. Free if purchased after December 14, 1987, otherwise \$25 plus return of original disk; \$125 new.

MacProject II features hierarchical subproject consolidation, planned and actual date and cost status, 8 customizable resource calendars, 8 resources per task, more than 1500 resources per project, unlimited number of tasks using subproject consolidation, extended search capabilities for generation of custom reports, customizable project table. Single, multiple, or partial resource assignments, multiple task relationships, up to 16 attributes per task displayed in Schedule Chart. Color plotter output for up to size E plotter. Supports MultiFinder. Claris, 440 Clyde Ave., Mountain View, CA 94043, 415/960-1500. \$145; \$495 new.

MacWrite version 5.0 features a spelling checker with 100,000-word dictionary, a Select All command, and keyboard shortcuts for frequently used functions including Insert Ruler, Select All, New, Open, Close, Save, and Print. Allows cursor control with the arrow keys and supports large-screen monitors. MultiFinder compatible. Claris, 440 Clyde Ave., Mountain View, CA 94043, 415/960-1500. Free if version 4.6 purchased after December 14, 1987, otherwise \$25 plus return of original disk; \$125 new.

Market Manager Plus version 2.0 provides basic reporting and tracking capabilities needed by all investors and handles client information needed by professional investors. Expanded files accommodate 256 portfolios and 1800 open positions. Generates several portfolio reports, such as Holding, Security Cross-Reference, Realized Gain/Loss, Transaction and Portfolio Master. Also includes fields for client data; hypothetical portfolio

(continues)

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PC Magazine, April 1987

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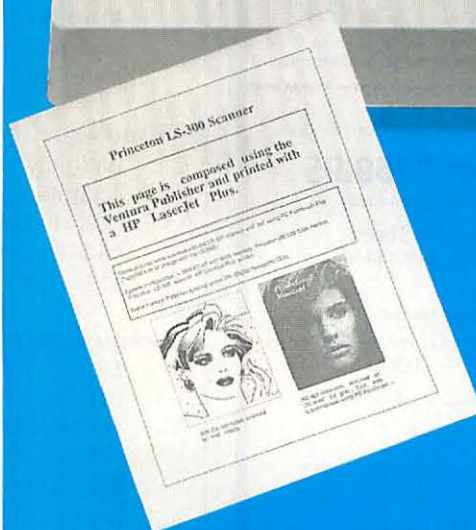
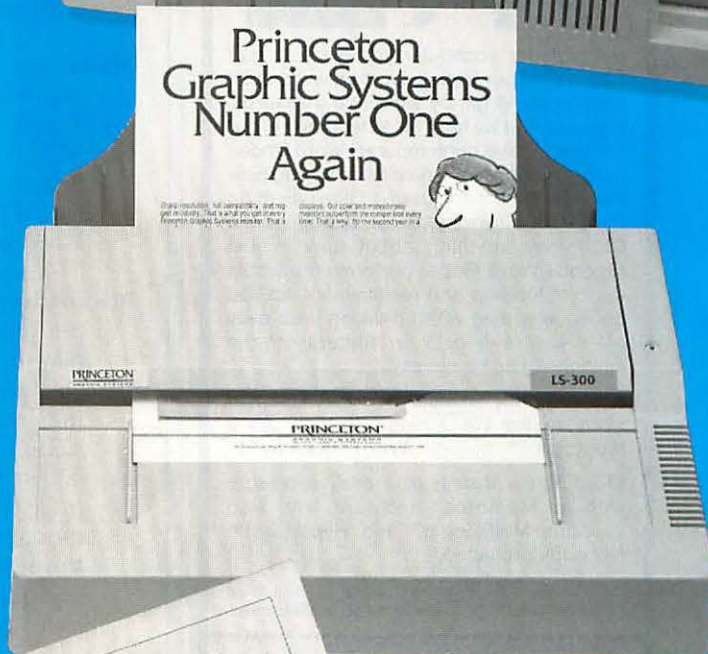
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Updates

for "what if" scenarios; calendar of financial activity; securities grouped by industry for reporting; valuing portfolios for a selected date in the past year; and saving prices collected from News/Retrieval in SYLK format for spreadsheet analysis. Dow Jones Software, P.O. Box 300, Princeton, NJ 08543, 609/452-1511. \$124.50; \$299 new.

MathType version 1.50 provides a two-way interface between MathType and TeX. Design Science, 6475-B E. Pacific Hwy., #392, Long Beach, CA 90803, 213/433-0685. Free if purchased before January 1, 1988, otherwise \$25; \$149 new.

MicroChem version 2.0 improves performance and graphics in display mode. It also adds two units: GAP and Macromolecular Modeling. Intersoft, 1 Concourse Plaza, 4711 Golf Rd., #412, Skokie, IL 60076, 312/699-4143. Upgrade price depends on current configuration, please call for quotes; \$145 to \$495 new, depending on unit and qualification (academic/industrial).

MindWrite version 1.12 is fully compatible with MultiFinder. Access Technology, 555-C Heritage Harbor, Monterey, CA 93940, 408/642-0522, 800/367-4334. Free; \$195 new.

Netmodem and NetSerial version 1.46 are fully compatible with MultiFinder. Shiva Corp., 222 Third St., #1200, Cambridge, MA 02142, 617/661-2026. Free; Netmodem and NetSerial 1200 \$449 each new, Netmodem and NetSerial 2400 \$599 each new.

QuickKeys version 1.1 is fully MultiFinder compatible. Adds recorder and QuickPanel. Lets you access Open Set/Save Set, Cut/Copy/Paste commands, and a QuickKey editor from the DA menu. Ability to make a click function as an Option-click or Shift-click. Supports international systems. CE Software, 801 73rd St., Des Moines, IA 50312, 515/224-1995. Free; \$99.95 new.

Scoop version 1.1 fixes bugs and prints larger documents on the Lino-tronic. Target Software, 14206 S.W. 136th St., Miami, FL 33186, 800/622-5483, 305/252-0892 in Florida. Free; \$495 new.

Stepping Out II adds such enhancements as fixed menu bar and palettes, 75 percent reductions, and the ability to change screen sizes while within an application. Features a new Control Panel user interface and screen view locking. Fully compatible with Mac II and MultiFinder. Berkeley System Design, 1708 Shattuck Ave., Berkeley, CA 94709, 415/540-5536. Free if previous version purchased after October 31, 1987, otherwise return original disk plus \$19.95; \$95 new.

WorksPlus Spell version 1.1A is fully compatible with Microsoft Works 1.1. Lundeen & Associates, P.O. Box 30038, Oakland, CA 94604, 415/893-7587. Free; \$79.95 new. □

To have products listed in this section, send upgraded software, an outline of major changes since the previous release, upgrade price, suggested retail price, company name, mailing address, and phone number to Updates, Macworld, 501 Second St., San Francisco, CA 94107.

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This listing provides company addresses and phone numbers for products mentioned in this issue. Allow several weeks for responses to Reader Service Card inquiries. Asterisks indicate vendors who prefer to be contacted by phone.

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A

- 701 **Acta.** Symmetry Corp., 761 E. University Dr., Ste. C, Mesa, AZ 85203, 602/844-2199, 800/624-2485.
- 702 **AEC Information Manager.** AEC Management Systems, Inc., 20524 Amethyst Ln., Germantown, MD 20874, 301/428-3694.
- 703 **Apple File Exchange.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
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- 705 **AppleShare.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
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- 707 **AppleTalk Custom Wiring Kit.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 708 **AppleTalk PC Card.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 709 **Apple 2MB Memory Expansion Kit.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 710 **AST-ICP.** AST Research, Inc., 2121 Alton Ave., Irvine, CA 92714-4992, 714/553-0340.

B

- 711 **Big Picture.** E-Machines Inc., 9305 S.W. Gemini Dr., Beaverton, OR 97005, 503/646-6699.
- 712 **Big Picture IQ.** E-Machines Inc., 9305 S.W. Gemini Dr., Beaverton, OR 97005, 503/646-6699.

C

- 713 **CADmover.** Kandu Software Corp., 2305 N. Kentucky St., Arlington, VA 22205, 703/532-0213.
- 714 **Cat Mac.** Phenix Specialties, Inc., 2981 Corvin Dr., Santa Clara, CA 95051, 408/733-9625.
- 715 **Coach Merriam-Webster Thesaurus.** Deneba Software, 7855 N.W. 12th St., #202, Miami, FL 33126, 305/594-6965, 800/622-6827.
- 716 **ColorBoard 1/104.** RasterOps Corp., 10161 Bubbs Rd., Cupertino, CA 95014, 408/446-4090.
- 717 **Colorizer.** Palomar Software, Inc., P.O. Box 120, Oceanside, CA 92054, 619/721-7000.
- 718 **ColorVue SE.** Orchid Technology, 45365 Northport Loop W, Fremont, CA 94538, 415/683-0300.
- 719 **ComServe.** Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201, 503/226-3620, 800/445-7085.
- 720 **Concentrator.** Du Pont Electronics, 515 Fishing Creek Rd., New Cumberland, PA 17070, 717/938-7683, 800/237-2374.
- 721 **Converter.** Du Pont Electronics, 515 Fishing Creek Rd., New Cumberland, PA 17070, 717/938-7683, 800/237-2374.
- 722 **C-Server.** Solana Electronics, 7887 Dunbrook Rd., Ste. A, San Diego, CA 92126, 619/566-1701.

D

- 723 **dBase Mac.** Ashton-Tate Corp., 20101 Hamilton Ave., Torrance, CA 90502-1319, 213/329-8000.
- 724 **Détente Reports.** WOS Data Systems, 1321 Wakarusa Dr., #2010, Lawrence, KS 66044, 913/843-8101.
- 725 **DiskQuick.** Ideaform, Inc., P.O. Box 1540, 612 W. Kirkwood, Fairfield, IA 52556, 515/472-7256.
- 726 **Disk Ranger.** Graham Software Co., 8609 Ingalls Circle, Arvada, CO 80003, 303/422-0757.
- * **DiskTools II (bundled with DiskTools Plus).** Electronic Arts, 1820 Gateway Dr., San Mateo, CA 94404, 415/571-7171.
- 727 **DiskTop.** CE Software, Inc., P.O. Box 65580, West Des Moines, IA 50265, 515/224-1995.
- 728 **Draw It Again, Sam...** Aba Software Inc., P.O. Box 850, Frazer, PA 19355-0915, 215/644-3580, 800/234-0230.

E

- * **Electra Guard 3+.** CPS Electronics, Inc., 4151 112th Terrace N, Clearwater, FL 34622, 813/578-1600, 800/237-6010.
- * **Electra Guard 5.** CPS Electronics, Inc., 4151 112th Terrace N, Clearwater, FL 34622, 813/578-1600, 800/237-6010.
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- 729 **EtherPort SE.** Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998.
- 730 **EtherPort II.** Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998.
- 731 **EtherSC.** Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998.
- 732 **Expressionist.** Allan Bonadio Associates, 1579 Dolores St., #24, San Francisco, CA 94110-4928, 415/282-5864.

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- F**
733 **FastNet.** Dove Computer Corp., 1200 N. 23rd St., Wilmington, NC 28405, 919/763-7918, 800/622-7627.
734 **FastPath.** Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998.
735 **FastPath 3.** Kinetics, Inc., 2500 Camino Diablo, Walnut Creek, CA 94596, 415/947-0998.
FileTree. Shareware by Jody Kravitz.
736 **Findswell.** Working Software, Inc., 321 Alvarado St., Ste. H, Monterey, CA 93940, 408/375-2828, 800/331-4321, 800/851-1986 in California.
737 **4th Dimension.** Acius, 20300 Stevens Creek Blvd., #495, Cupertino, CA 95014, 408/252-4444.
738 **Full Page Display for the Macintosh II.** Radius, Inc., 404 E. Plumeria Dr., San Jose, CA 95134, 408/434-1010.
- G**
739 **Giga Tower.** NuData Inc., 4201 Burton Dr., Santa Clara, CA 95054, 408/727-1049, 800/832-8268.
- H**
HFS Dir. Shareware by OITC.
740 **HFS Locator Plus.** PBI Software, Inc., 1163 Triton Dr., Foster City, CA 94404, 415/349-8765.
741 **HFS Navigator.** Symantec Corp., 135 South Rd., Bedford, MA 01730, 617/275-4800, 800/648-4465.
742 **HyperCard.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- I**
743 **ImageWriter LQ.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
744 **InBox for the Macintosh.** Symantec Corp., 135 South Rd., Bedford, MA 01730, 617/275-4800, 800/648-4465.
745 **InBox/PC.** Symantec Corp., 135 South Rd., Bedford, MA 01730, 617/275-4800, 800/648-4465.
746 **Inside Out.** Shana Enterprises Inc., 9704 54th Ave., #200, Edmonton, Alberta, Canada T6E 0A9, 403/438-6548.
747 **InterBridge.** Hayes Microcomputer Products, Inc., P.O. Box 105203, Atlanta, GA 30348, 404/441-1617.
748 **Interleaf Publisher.** Interleaf, Inc., Ten Canal Park, Cambridge, MA 02141, 617/577-9800.
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- J**
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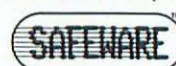
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- 750 **LaserServe.** Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201, 503/226-3620, 800/445-7085.
- 751 **LaserServer.** DataSpace Corp., 185 Riviera Dr., Unit 9, Markham, Ontario, Canada L3R 5J6, 416/474-0113, 800/387-0492.
- 752 **LaserShare.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 753 **LaserSpeed.** Symantec Corp., 135 South Rd., Bedford, MA 01730, 617/275-4800, 800/648-4465.
- 754 **LaserView Display System.** Sigma Designs, 46501 Landing Pkwy., Fremont, CA 94538, 415/770-0100.
- 755 **LocalTalk Locking Cable Kit—10 Meter.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 756 **LocalTalk Locking Connector Kit—DB9.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 757 **LocalTalk Locking Connector Kit—DIN8.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- Locare.** Shareware by Raymond Lau.



- 758 **M.** Intelligent Computer Music Systems, Inc., P.O. Box 8748, Albany, NY 12208, 518/434-4110.
- * **MacAccess.** Inventab, Dälbyvägen 3, S223 60 Lund, Sweden, (0)46/13 51 80.
- 759 **Maccessories Control Center.** Kensington Microware Ltd., 251 Park Ave. S, New York, NY 10010, 212/475-5200, 800/535-4242.
- 760 **Maccessories Surge Suppressor.** Kensington Microware Ltd., 251 Park Ave. S, New York, NY 10010, 212/475-5200, 800/535-4242.
- 761 **MacCracker.** Icon Review, P.O. Box 911, Dept. CT097, Monterey, CA 93942, 408/625-0465.
- 762 **Macintosh II EtherTalk Interface Card.** Apple Computer, Inc., 20525 Mariani Ave., Cupertino, CA 95014, 408/996-1010.
- 763 **MacLinkPlus.** DataViz Inc., 16 Winfield St., Norwalk, CT 06855, 203/866-4944.
- 764 **MacMail.** Aegis Development, Inc., 2210 Wilshire Blvd., #277, Santa Monica, CA 90403, 213/392-9972, 800/345-9871.
- 765 **MacOpener.** Central Products Corp., P.O. Box 980305, Houston, TX 77098, 713/529-1080.
- 766 **MacServe.** Infosphere, Inc., 4730 S.W. Macadam Ave., Portland, OR 97201, 503/226-3620, 800/445-7085.
- 767 **MacSnap 2S/2H.** Dove Computer Corp., 1200 N. 23rd St., Wilmington, NC 28405, 919/763-7918, 800/622-7627.
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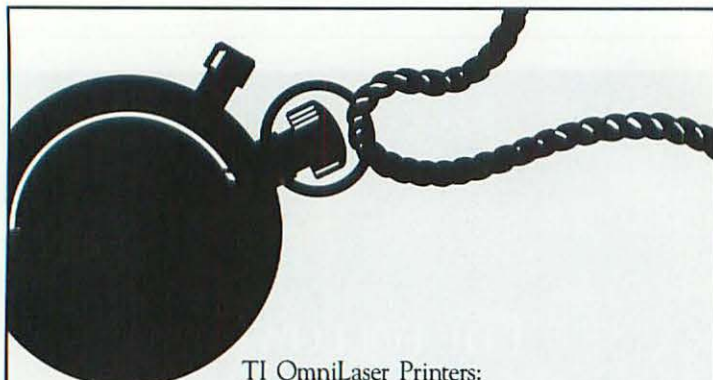
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- 774 **Math Wizard.** Unicorn Software Co., 2950 E. Flamingo Rd., Greenview Plaza, Ste. B, Las Vegas, NV 89121, 702/737-8862.
- 775 **MathWriter.** Cooke Publications, P.O. Box 4448, Ithaca, NY 14852, 607/272-2708, 800/482-4438 ext. 15, 800/435-4438 ext. 15 in New York.
- 776 **MaxPlus Mega.** MacMemory, Inc., 2480 N. First St., San Jose, CA 95131, 408/922-0140, 800/862-2636.
- 777 **MDC II.** New Canaan Microcode, 136 Beech Rd., New Canaan, CT 06840, 203/966-6969.
- 778 **MegaScreen 2001.** MegaGraphics, Inc., 20954 Osborne St., Canoga Park, CA 91304, 818/407-0571.
- 779 **MegaTalk Plus.** MegaGraphics, Inc., 20954 Osborne St., Canoga Park, CA 91304, 818/407-0571.
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- 780 **Micro Dynamics MARS.** Micro Dynamics, Ltd., 8555 16th St., #802, Silver Spring, MD 20910, 301/598-6300, 800/634-7638.
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- 784 **Mini Power Control.** Relax Technology, 3101 Whipple Rd., #22, Union City, CA 94587, 415/471-6112, 800/848-1313.
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- 790 **MultiUser Helix.** Odesta Corp., 4084 Commercial Ave., Northbrook, IL 60062, 312/498-5615, 800/323-5423.
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* **PixelPaint.** SuperMac Software, 295 N. Bernardo Ave., Mountain View, CA 94043, 415/964-9694.

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- 839 **WriteNow.** T/Maker Co., 1973 Landings Dr., Mountain View, CA 94043, 415/962-0195.
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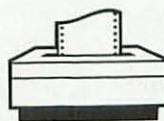
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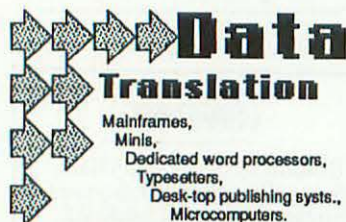
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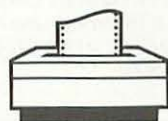
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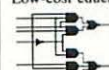
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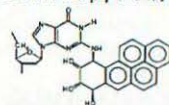
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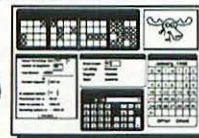
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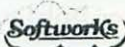
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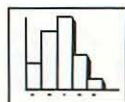
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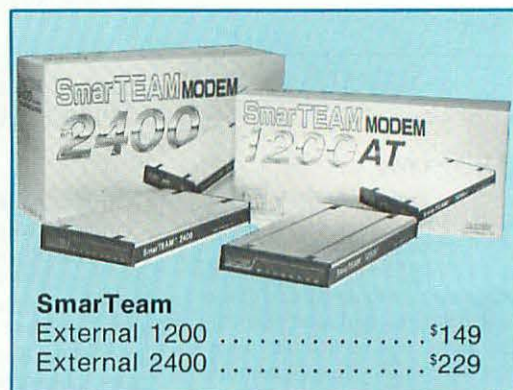
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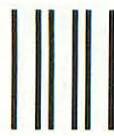


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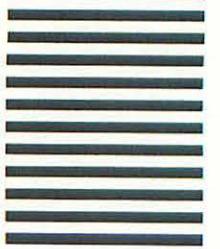
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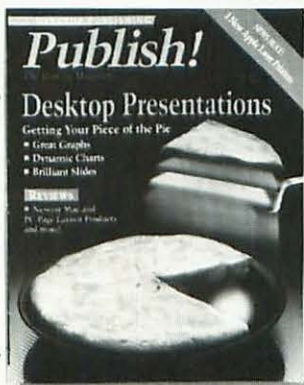
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Macworld Best-Sellers

Months on chart	Last month	This month	
			Business Software
15	1	1	Microsoft Works <i>Microsoft</i>
27	3	2	Microsoft Excel <i>Microsoft</i>
35	2	3	Microsoft Word <i>Microsoft</i>
23	4	4	PageMaker <i>Aldus</i>
14	—	5	MacWrite <i>Claris</i>
13	5	6	SuperPaint <i>Silicon Beach Software</i>
3	—	7	Cricket Draw <i>Cricket Software</i>
30	7	8	MacDraw <i>Apple Computer</i>
2	—	9	Printshop <i>Broderbund Software</i>
1	—	10	dBase Mac <i>Ashton-Tate</i>

			Education Software
19	1	1	Math Blaster <i>Davidson & Associates</i>
17	5	2	Typing Tutor III <i>Simon & Schuster Computer Software</i>
19	2	3	KidsTime <i>Great Wave Software</i>
3	4	4	Reader Rabbit <i>The Learning Company</i>
8	—	5	MacEdge II <i>Think Educational Software</i>

			Entertainment Software
15	2	1	Dark Castle <i>Silicon Beach Software</i>
19	3	2	MacGolf <i>Practical Computer Applications</i>
19	1	3	Flight Simulator <i>Microsoft</i>
1	—	4	Falcon <i>Spectrum Holobyte</i>
2	4	5	ShadowGate <i>Mindscape</i>

			Networking/Data Communications
15	1	1	TOPS <i>TOPS</i>
19	2	2	AppleTalk <i>Apple Computer</i>
11	3	3	AppleShare <i>Apple Computer</i>
3	4	4	PhoneNet <i>Farallon Computing</i>
18	5	5	MacServe <i>Infosphere</i>

Months on chart	Last month	This month	
			Hard Disks*
15	1	1	Apple Hard Disk 20/20SC <i>Apple Computer</i>
8	2	2	Macintosh Internal 20SC Hard Disk <i>Apple Computer</i>
8	—	3	Rodime 20 Plus <i>Rodime Peripheral Systems Division</i>
2	3	4	Rodime 45/45 Plus <i>Rodime Peripheral Systems Division</i>
2	4	5	MacStack 20 <i>CMS Enhancements</i>

			Add-in Boards
6	1	1	Apple 2MB Memory Expansion Kit <i>Apple Computer</i>
6	3	2	Radius Accelerator <i>Radius</i>
6	2	3	Apple 1MB Memory Expansion Kit <i>Apple Computer</i>
3	—	4	Video Board/Large Screen <i>Ryad</i>
1	—	5	Mac286 <i>AST Research</i>

Product Watch

Editors' choice:
Other recent or forthcoming products of particular interest.

Datacopy Model 940 *Datacopy* 8-bit gray-scale scanner
Falcon Spectrum *Holobyte* multiuser game
Finale *Coda Software* music publishing software

Source: Exclusive InfoCorp survey of more than 125 Macintosh retailers and selected mail-order suppliers. Covers sales during January 1988.

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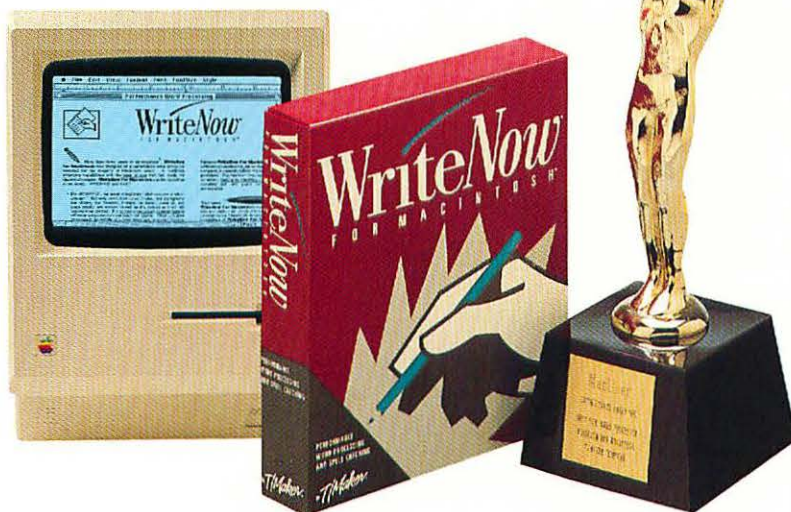
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